THE JOURNAL

OF THE

ANTHROPOLOGICAL INSTITUTE

OF

GREAT BRITAIN AND IRELAND.

DECEMBER 12TH, 1893.

F. W. RUDLER, Esq., F.G.S., *in the Chair.*
Afterwards Professor A. MACALISTER, F.R.S., *President.*

The Minutes of the last Meeting were read and signed.

The election of the following new Members was announced:—

PERCY CALDECOTT, Esq., of the Constitutional Club.

ARTHUR EBBELS, Esq., of 87, Bromfelde Road, Clapham.

The presents that had been received were announced and thanks voted to the respective donors.

Mr. W. L. DUCKWORTH, B.A., read a paper on the "Australian Crania in the collection of the Cambridge University Museum."

The following papers were also read:—

"On an unusual form of Rush Basket from the Northern Territory of South Australia," by R. ETHERIDGE, Junr.

"On a modification of the Aboriginal Weapon, termed the Leonile, Langeel, Bendi or Buccan," and

"On an Australian Aboriginal Musical Instrument," by the same.

"The Aborigines of North Western Australia," by P. W. BASSETT-SMITH, R.N.

"Rites and Customs of Australian Aborigines," by H. B. PURCELL.

"Japanese Onomatopes, and the Origin of Language," by W. G. Aston, C.M.G.

REMARKS *on the* FLINT IMPLEMENTS *from the* CHALK PLATEAU *of* KENT. By A. M. BELL, M.A.

[WITH PLATES XIV, XV, XVI.]

[Read November 14th.]

THE paper read by Professor Prestwich to the Institute[1] on June 23rd, 1891, brought forward and supported two distinct propositions: first, that the worked flints found on the Chalk Plateau are of an early date, which can on geological evidence be shown to be earlier than the date of implements found on the Greensand escarpment or in the raised terraces of the neighbouring river valleys; and second, that a large class of chipped flints, found on the plateau, which do not possess either in their forms or in their workmanship the full characteristics of flints hitherto recognised as artificially worked and shaped, still do possess true and trustworthy indication of human handiwork, and point us backwards to an early age in the development of mankind. In both of these views, which were supported by detailed argument, acquaintance with the locality, and with the implements or supposed implements in question, leads me to believe that Professor Prestwich was right, and that, as the subject receives close and further examination, so will each of his conclusions be established and confirmed.

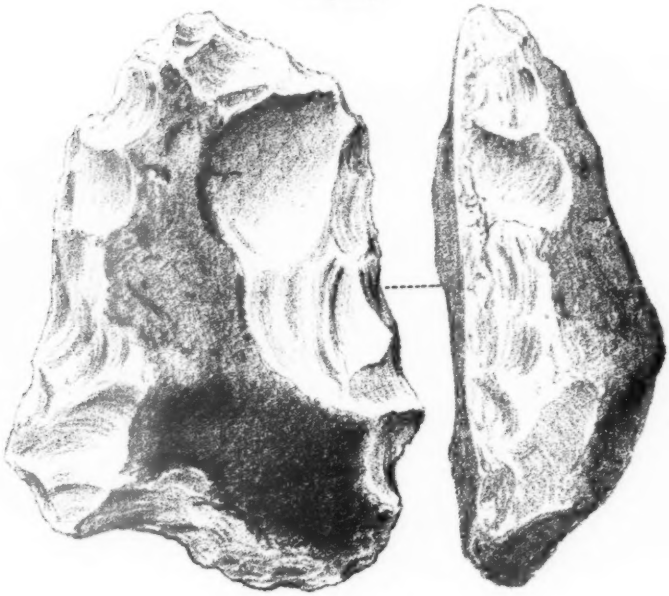
This cannot be said to have been the view taken by his audience. The subject was one which required a reconsideration of previous opinions, which cannot be given in a moment; hence in the discussion which followed, those who approved rightly assumed a guarded and tentative attitude, while disapproval put on no such limitation.

Professor Boyd Dawkins denied both the conclusions of the more venerable Professor; he would neither accept the age of the plateau finds as anterior to river-valley finds; nor would he allow the new class of implements. The authority of Professor Boyd Dawkins' opinion is justly great, so that it is natural to attempt to understand the reasons which he found convincing, and to follow them out a little, to find whether they are in harmony with the facts which they undertake to explain. He is reported to have said that he saw no reason why flints found at the top of a hill should be older than flints found at the bottom of a hill. River-valley man was a wanderer, and was careless of possessions which were cumbrous to carry and easy to replace; hence he dropped flints here and there as he passed to and fro.

This theory is true; so far as I am aware, it has never been denied that this supposition rightly accounts for a few, an exceptional few, of the flints of the plateau. Some flints have eben found there of excellent workmanship and perfectly regular types. They are not numerous, and some years of searching

[1] "Quart. Journ. Geol. Soc." May, 1889; "Journ. Anthrop. Inst.," Feb. 1892.

1. (733).



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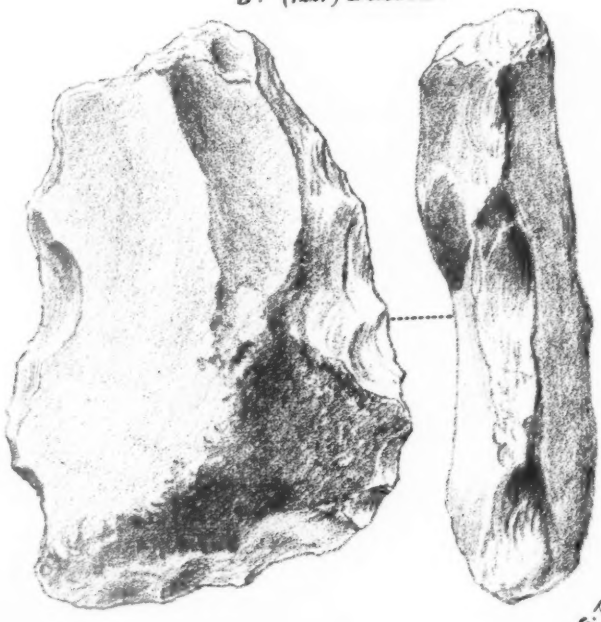

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2^a (1589) *Unbulbed.*

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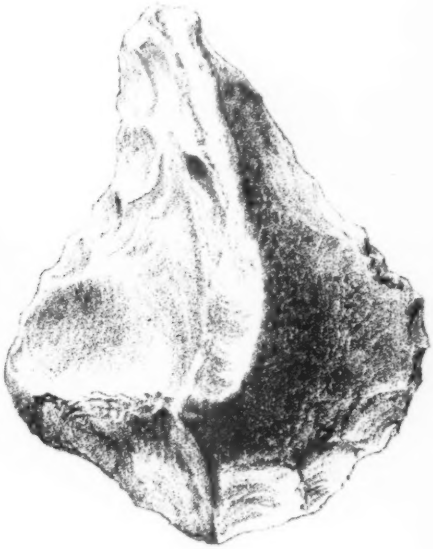

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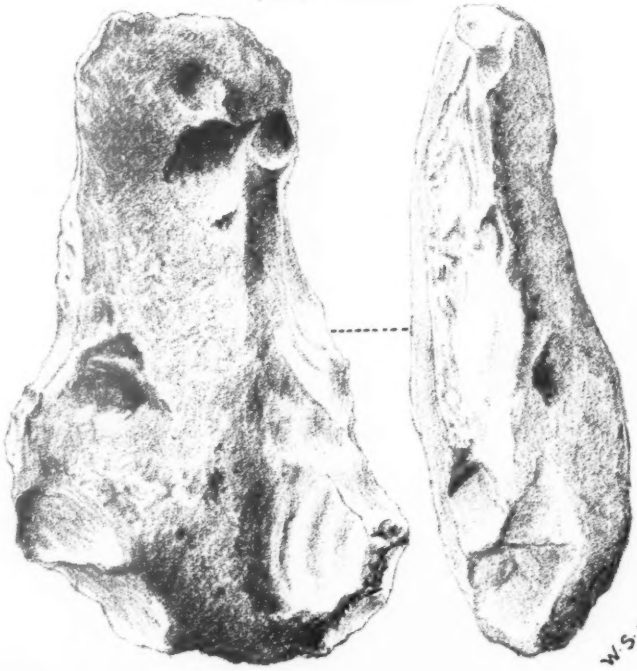

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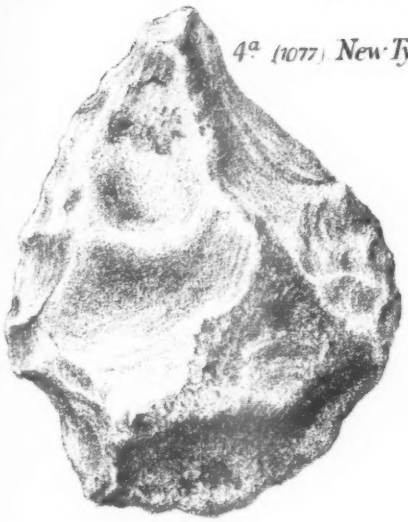

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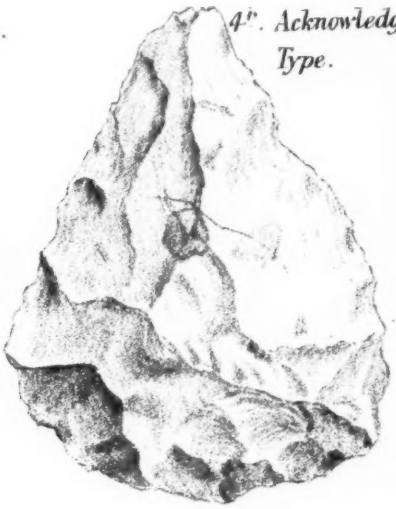

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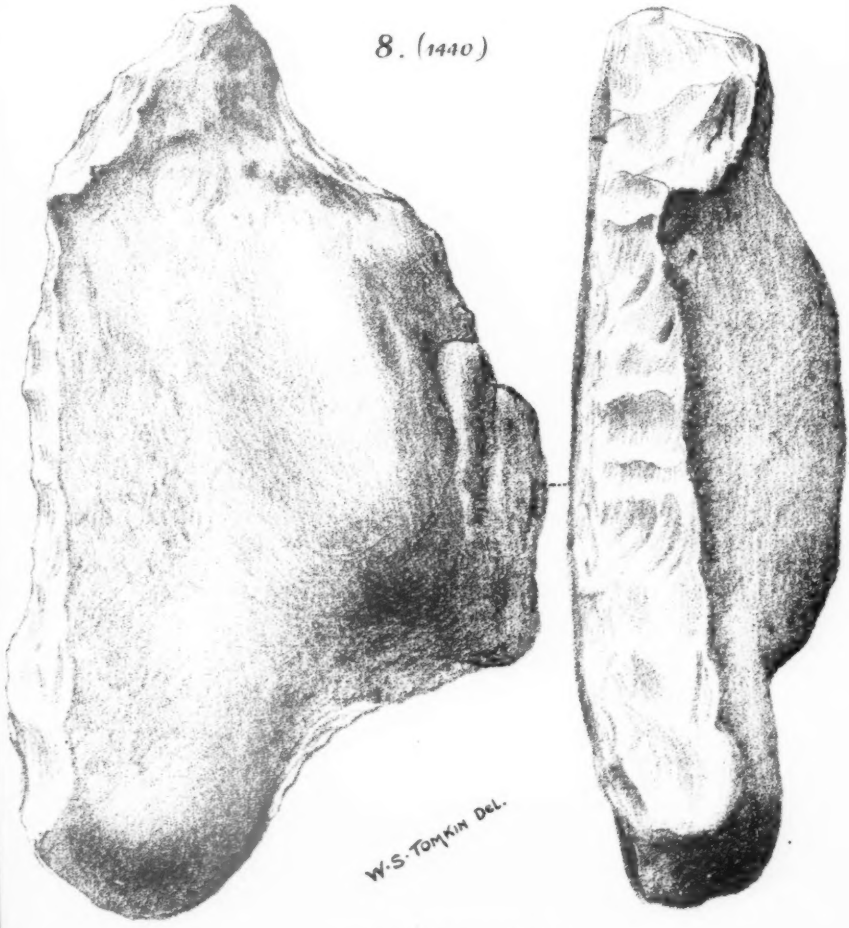

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passed before one was found. When first one of them was put before me, the theory of Mr. Harrison, its discoverer, was the same as that by which Professor Boyd Dawkins proposes to account for all the flints of the plateau; the flint had been dropped by river-valley man in his nomad life. Still, this admission does not shake or impair the belief that the majority of implements found on the plateau are of greater age. Surface finds, as will subsequently be shown by an example, must necessarily contain objects of various ages; the river-valley stage was of long duration, and the North Downs were undoubtedly exposed, during the period, so that some relics of the time are naturally to be looked for on the heights. But we do not associate them with the majority of the finds. The few flints of ordinary palæolithic type found on the plateau are quite unworn and unrolled, their edges are sharp, as if they had fallen to the ground when freshly used, and stopped where they fell. They throw themselves into a class by themselves, alike by their number, their condition, and their type. The majority are in a different case; they are worn and rolled; in other words, they are no longer in the place where they fell, but have travelled from some distance and been brought down from elsewhere to the places in which they were found lying. They are moreover found, some of them at all events, in distinct patches of ochreous gravel, from which they cannot be distinguished. The rolled condition and the association with worn and ochreous gravel are the points which riveted the attention of observers on the spot. Yet if I understand the Professor aright, his contention, as we follow it out a little in the presence of the facts to be explained, is this: "You have here a spread of gravel, excessively worn and rolled, and peculiarly stained, quite different from the blue and white sharp-edged flint in the neighbouring fields. Worked flints lie in the gravel, and are worn and stained exactly as the gravel is worn and stained. Yet you are wrong to associate the worked flints with the gravel; you will do more wisely by associating them with a few worked flints, which you have also found on the plateau, but which in shape and condition show quite different characteristics." Now, I decline to follow this verdict, because the flints themselves pronounce against it. Yet let us grant the supposition for a moment, and see to what it leads us. Wandering river-valley men dropped in these gravel-beds a worn tool; as it was worn, it belonged presumably to his predecessors. Granted, it was possible for him to find a worn implement by burrowing in a raised terrace of gravel, but where could he have found one similarly stained? I have seen hundreds of Thames river-valley implements, and have had ten years' acquaintance with

the surface soil, and have only found one such implement, and seen two more, obtained by Mr. Worthington Smith, in gravel beds near Canterbury[1]; where they could have been procured in numbers I do not know. Yet unless this is plain, Professor Boyd Dawkins' theory is not intelligible; even if it were plain, is it not a theory which chooses the improbable instead of the obvious? Why should we not believe that stones, formed of the same material, found side by side, alike worn and alike weather-stained, owe these peculiar effects to the same causes?

In a more recent paper,[2] Professor Boyd Dawkins again alludes to this subject. This time his argument is of a different nature, not perhaps quite consistent with the first, in which the implements were considered as of regular palæolithic type and age. They are now to be considered as imperfect implements, the wasters of a toolshop. "The splinters and other rude fragments of the block must preponderate in the places of manufacture, while the finished implements are carried off for use elsewhere, and are likely to be more numerous where they have been used and lost."

Very good and true when rightly applied, as it is rightly applied to axes of palæolithic form but neolithic age and weathering, found on the surface of the South Downs. But let us examine the argument a little, and find whether in the present case it fits with the facts, and suggests their probable solution. We are to consider the plateau as a workshop. I have never had the good fortune to light upon a palæolithic floor or workshop, in or nearly in the state in which it was left by its quondam occupants, but I have seen many neolithic workshops, and will describe their salient features. Botley Hill, the height above Titsey Place, was a workshop; there flints were mined from the Chalk, and on the fields around hundreds of rude lumps, awkward spalls and splinters lie about, together with a smaller proportion of ordinary flakes and a few scrapers. Evidently the rude blocks, as they were taken out of the earth, were roughly shaped at the pit-mouth, before they were conveyed further. About a mile distant to the south, on Broomlands Farm and the Rocks Farm, are two sunny ridges, where the soil abounds in small, fine flakes, often very tiny and very thin. These were also workshops, where celts were fashioned, and fine workmanship was done. In the great manufactory near Berling Gap on the South Downs, I saw in one large field many thousands of flakes; at the sight of the extraordinary numbers—more than all the waste heaps in Brandon village—the words involuntarily rose to my lips: "This was a workshop, these

[1] See "Man, the Primeval Savage," by Worthington G. Smith: London, E. Stanford, 1894; p. 216, for an illustration and account of these rare implements.
[2] "Journ. Anthrop. Inst.," Feb., 1894.

are the shavings which still line the floor." Such a sight I have never seen on the North Downs, nor anything in the very least resembling it. After searching for hours together on what was reckoned fertile ground, I have thought it fair fortune to carry off a single worked flake, and have often found nothing at all. This does not resemble a place of manufacture, and the point at issue, that of numbers, is one which must be essential to a place of manufacture: a workshop where the materials left behind are few and far between is on the face of it an improbable theory. Let us follow this argument also a step further. Professor Boyd Dawkins, as previously said, is asked to account for certain rolled and worn stones; they are the *crux*; on their account a special and geologically definite age has been claimed for the plateau finds. His answer is: "They are the remains of a workshop, the useless out-throw left lying on the ground." How can the relics of a workshop be rolled, since the wear of rolling means that they have been moved? The flakes found by Mr. Spurrell in a palæolithic workshop at Crayford are as sharp to-day as they originally were. The sharp edges of both flakes and implements found on the palæolithic floors at Caddington and at Stoke Newington are constantly mentioned by Mr. Worthington Smith in his attractive work already referred to. Why are those in the plateau so different? Professor Boyd Dawkins does not say, but I submit that, before he asks us to believe anything so improbable in itself and so contrary to experience obtained in other places, he is bound to explain what he supposes the conditions to have been under which flints with their angles all rolled away are to be regarded as still lying on the spot where they were chipped from the parent block. Until he does this and persuades us, why should we not believe that the line of argument, chosen and maintained in detail by Prof. Prestwich, is very much the more probable—namely, that the stones are not on a workshop floor at all, but in an old gravel-drift, which reached its present position, and obtained its present condition by rolling down, in accordance with the law of gravitation, from some higher level?

In the same article is another statement, which, in the broad way in which it is stated, ought not to pass unchallenged. On page 250 are the words: "The implements of palæolithic form which lie scattered over the surface of Southern England are not necessarily of palæolithic age." Certainly they are not, but with a very important limitation, which the writer does not add—namely, that the condition, material, and weathering of the flints in question associate them with the neolithic remains which lie scattered equally or more abundantly over the surface. I trust

that I do no injustice to Professor Dawkins' line of argument in trying to follow it out, and place it in distinct form and outline before my own mind. I understand it thus: "A true find is *in situ* in the solid shingle of a gravel-pit, or in the soft unstirred layer of brick-earth. When a flint is found on the surface, it cannot be proved to be older than the most recent surface-age." This position is very natural, quite right to start with, but let us examine if it is tenable at the last. Suppose a collection of flint implements from the same area, in which the distinction of neolithic and palæolithic forms distinctly appears. This of itself creates two classes. Next suppose an implement found, which is palæolithic in shape, but otherwise does not resemble the supposed palæolithic flints and does resemble the undoubtedly neolithic flints, then it is rightly classed as a neolithic accident. If the collector has himself attempted to shape flint with a quartzite pebble as his hammer, he will well understand the possibility of accidental shapes arising. But on the other hand, if a whole series is found, in which various acknowledged palæolithic types are all reproduced, and all or almost all of the implements have not been shaped out of flints quarried from the Chalk, such as neolithic men chiefly used, but are made of the weathered surface flint; if further, all the implements are weathered and cracked by time and exposure in a perfectly different manner to the neolithic flints found on the surface, why should we not believe them to be of palæolithic age? To what other age can we refer them? During the years 1883–1889 a collection of this kind was obtained by the writer from the surface soil near Limpsfield in Surrey. The collection was seen by various competent persons, none of whom doubted that it came from palæolithic times. All the examples, hundreds in number, came from the surface, with one exception which might have been explained away, as an accidental drop-down through a sun-crack in the soil. Yet various reasons led me to associate the finds as a whole with the time when the Limpsfield gravel-bed was deposited, and also with some neighbouring deposits of brick-earth.[1] In 1889 a paper was written by me, though not published, containing the reasonings which led to this conclusion. This position deserves notice; Professor Boyd Dawkins, unless I misunderstand him, would say, "surface finds, not necessarily palæolithic." Continued observation of seven years led me to say, "surface finds, but synchronous with the gravel and brick-earth."

In the years 1890 and subsequently numerous *in situ* finds in the gravel and one in the brick-earth proved that my inferences were true; but they were just as true before the finds were made

[1] W. Topley, "Geol. of the Weald," p. 193, 4. J. Prestwich, "Quarterly Journal of the Geol. Society for May, 1891," pp. 137 and foll:

as they were after them ; yet unless I mistake his meaning the Professor would have attached no weight to them at all. This is pushing a sceptical attitude too far ; any one who reasons on subjects so complex and remote from experience will do well to recognise clearly the nature of the conclusions to which he is limited by the facts. Absolute certainty comes from consciousness alone, and is impossible ; testimony supplies a second or borrowed consciousness, and is equally impossible. For this reason a sceptical attitude is the right attitude to begin with. But as facts are amassed, they begin to throw themselves into ordered classes, and arguments of greater or less probability begin to arise from them. Probability is all that can be obtained, but when probabilities are great and all point in one direction, then the sceptical attitude may be dropped, and a positive and constructive parable should be taken up and expounded. Those who are interested in the subject know the nature of the reasoning, and are content to consider that very great probabilities are identical with certainty.

Viewing this part of the inquiry in another light, it is worth while to show that surface finds are necessarily various, and yet may with practical certainty be referred to various ages and various workshops. On the surface of the same field in Surrey I picked up at different times the following miscellaneous collection; (1) the arm of a child's doll, in porcelain ; (2) a Brahma-bull, in Indian soapstone ; (3) the lid of a Wedgewood teapot, in black basaltes ; (4) fragments of oriental and mediæval pottery ; (5) a coin of Septimius Severus; (6) a neolithic arrow head; (7) a palæolithic axe; (8) a rolled pebble, of Tertiary quartzite; (9) a fossil, coniferous wood from the Greensand ; (10) a rolled pebble of Lydian stone, of palæozoic age. Though these objects occur together, we are by no means bound to consider that the arguments by which we refer them severally to various dates in a long sequence are at all fallacious. We do not lump dissimilars together, but make distinctions, and refer the separate product to a separate workshop and a separate age.

Now let us go back to number eight in the above list. How does it happen that a rolled pebble of Tertiary quartzite comes to lie on the surface of the Lower Greensand ? Is it not because it represents an older formation which once spread generally over the area, but has now been entirely wasted away, with the exception of a few fragments of its hardest portions, which by their material show what they are, and by their polish, that is their continued rolling, show what they have suffered ? This will hardly be denied, and proves that it is equally possible that on the exposed ridge of the North Downs or elsewhere, earth

may have been washed away so as to leave on the surface a series of hard flints once encased in soluble clay. This I believe to have happened both on the Greensand encampment and on the Chalk Plateau, and to be a very good reason for assigning surface finds to palæolithic age.

Professor Boyd Dawkins goes on: "The materials out of which the implements have been fashioned, the colouring and the abrasion of their angles and edges, appear to me to be merely local accidents, and unimportant for the purposes of classification." This again is hewing with an axe, when a dissecting knife is the more appropriate tool. Local accidents they certainly are, but why are they unimportant? If we find that neolithic flints found on the surface are framed from selected flints, quarried from the chalk, and that palæolithic flints have been shaped out of stones picked up on the surface and not quarried; if we can prove this to be so by portions of the bark or original unworked surface on portions of their sides, which in the palæolithic flint is rusty and brown, like the long-exposed surface flint, and never so in the neolithic, why should we consider the material unimportant? "But weather and wear are treacherous signs." Certainly they are difficult, and a series of chemical experiments on the subject is very desirable; on my table as I write are two flints taken from the Roman Villa in Titsey Park. Beyond doubt they were chipped at the same time by the Roman mason; yet one is weathered, and the other is unaltered. So from an isolated example of weather I am in no haste to draw a conclusion; but it is different with a class. Find twenty worked flints in a gravel-bed, and as surely we shall find that the weathering of the flints as a class finds a counterpart in the weathering of the gravel as a class. So when we find on the plateau spreads of implementiferous gravel perfectly peculiar in their staining and in their rolled and weathered condition, it is in a certain sense a local accident, but is not unimportant. The result is general and not isolated, and therefore due to a cause which worked on a general and extensive scale. Even an isolated local accident, such as the occurrence of a single erratic, may be important and lead to grave inferences. Local accidents, which group themselves together, are very, very rarely unimportant. The striation of a boulder which we can hold in the hand is an apparent trifle, yet because such boulders and such striations formed a class, the accident has led to great conclusions. The clay at Hordwell, with its contained fossils, is a local accident, which Mr. Brander, the keeper of the British Museum a hundred and thirty years ago, "was apt to think would remain for ever a mystery." Instances of this kind, in which local accidents have

proved to be both more important, and more susceptible of explanation than they were originally supposed to be, will readily occur to a Professor of Geology. So also with surface finds; if they possess definite characteristics of form, of wear, of weather, of material, of working, of position when found, each of which places them in a class by themselves, much more all when taken together, then these are certainly local accidents, but they have their importance. There is a key called Promise, which will open the doors of Doubting Castle. Beyond doubt it is at once more delightful and more satisfactory to find *in situ*, and the more numerous and perfect the associated remains of extinct animals, so much the better. But let us recognise that we cannot always be so fortunate. Nature does not create deposits simply to further palæontological research; yet even when this crowning evidence is denied we are not left desolate. Time does not go by without leaving its record: change does not take place without a cause; we may yet follow these changes, and interpret these records, instead of tossing them aside as unimportant.

Therefore I am unable to find these arguments convincing: the first, because it explains little; the second, because it is inapplicable; and the third, because it goes beyond the due limit of a negative attitude; and further and chiefly, because the arguments, when viewed as a whole, or followed out to their conclusions, recede more and more from the facts at issue, and leave the conclusions of Professor Prestwich untouched.

Professor Boyd Dawkins was equally opposed to what I have called the second proposition of Professor Prestwich, the acceptance of a new class of flints as having been used by man, and in this he received a qualified, not an absolute support from the highest authority. Sir John Evans refused to accept by far the greater number, not all, as I understand, but by far the greater number of the flints produced as coming from the hand of man, and asked his hearers to think once, twice, and thrice before they accepted them as of human workmanship.

These words are the text of the following remarks[1]: such a caution is natural and intelligible; for several years I held myself the same negative attitude, and thought much oftener than three times before altering my opinion, and now see no reason to repent, nor any way to escape from the reasoning which convinced me. So I would ask all who are interested to think once, twice, and thrice. The first sight may create aversion and mistrust because the collection as a whole differs from what

[1] It should perhaps be said that this article was substantially written towards the close of the year 1891, though it has been slightly remodelled before publication.

we have long regarded as alone deserving to be thought worked or used flints. But if this initial diffidence be looked in the face, and the types examined individually on their own merits, and not in the light of preconceived ideas, then I believe the flints will be found to have a good deal to say for themselves, and will confirm Professor Prestwich's view. Hitherto it can hardly be said that they have had a patient hearing, and it is not fair that the conclusions which have been reached by competent investigators by patient research extended over a series of years, should be rejected in as many minutes after one hasty glance. Such, I am convinced, will not be the attitude of the limited public who wish simply to find the truth: they will think once, twice, and thrice.

In the year 1885 one of these implements was first put into my hands by Mr. Harrison, at Ightham, and my opinion was asked. It was a tabular flint, with blunt, rectangular edges, chipped all round. I remarked at once on the absence of bulb, and denied therefore that the flint was shaped by man. The chipping on the edges might, I said, have come from Nature. Suppose a flint to be jammed in a stream; the edge that is uppermost becomes chipped by the pebbles which float down with the current; let it be dislodged, and fixed again elsewhere with another edge upwards, that edge will become chipped, and so all edges may be chipped. Again a flint in a gravel-bed does not always lie quite still: water filters through and creates hollows: the incidence of pressure alters, and with each slight subsidence the edge of a flint becomes chipped, sometimes with surprising regularity. So I refused to accept it, and asked Mr. Harrison if he had shown such a flint to Sir John Evans. He replied that he had, and had received an answer to the effect that any doubtful flint without a bulb might be thrown away; it would lead to no fruitful conclusion.

This was much the opinion which I had expressed myself, and I had good reason to think it sound doctrine. I was very sensible that the peculiarity of flint to break under an artificial blow into a strongly-marked conchoidal fracture, first pointed out, I believe, by the late Professor Falconer, had thrown an unexpected light upon studies which, before its importance was appreciated, were jumbled and uncertain. By the aid of the evidence of "bulb and flake" I was then developing the palæolithic field around Limpsfield, which was producing an instructive harvest. Week by week was bringing in some type figured by Sir John Evans, until almost all appeared. From his works I had first derived clear ideas of the importance of flint as a factor in the material progress of mankind; I had learned to look on human life in a newer and truer aspect: by

visiting almost all the sections named by him I had seen for myself the geologic evidence of the long lapse of time which separates river-valley men from ourselves; with his impressive words in my mind I had looked on Barton Cliff, the Solent, and the Isle of Wight, a scene, which more than others in our island, enables us to set ourselves free from what is to most of us a real difficulty, the inability to conceive that man can really have lived in the world for such a very long time, and did certainly exist at a time when the features of land and sea presented scenes very different from those which now meet our eyes. Above all, the kindness of Sir John Evans had taught me to distinguish a worked flint from a natural fracture—not a very easy problem to a museum-taught beginner stranded on a bare field with a million broken flints around—and I had no disposition, then or now, to put myself on a level with my teacher. Therefore I held by his dictum; the bulb was good doctrine, assuring practical certainty and a definite guide, which a plain man could follow and all could understand. For several years I looked upon this opinion as decisive: the bulb was essential.

I have now changed that opinion, slowly and after mature deliberation, and believe that I was as reasonable in rejecting it as I had previously been in adopting it. The flints themselves, and they alone, persuaded and convinced me—partly those in Mr. Harrison's collection, partly those found by myself in numerous excursions to the Chalk Plateau.

The first of the unbulbed flints to shake my previous judgment was a tabular flint chipped all round the edges. It might have been natural; but the regularity, the sameness of strength in the blows, gave to the stone a character, an indefinite something which seemed the expression of a purpose, and not to be due to the irregular, random work of nature. At the same time I would give way no further than to allow that such an example might very probably be of human handiwork, not of Nature's. The example given (Plate XIV, Fig. 1, 739 in Mr. Harrison's collection) is one of this class. It is very hard to believe that the flaking here is accidental.

I was more strongly decided by one, or rather by several of the curved and notched specimens, similar to that figured by Professor Prestwich, No. 4, Plate XX, vol. xxi of the Institute's Journal. I could not think of a natural method by which the centre of a small but deep curve should be neatly and regularly chipped, while the prominent and exposed ends of the curve are untouched; much less how this could occur in a number of instances. A large series of this type has been collected by Mr. Harrison and Mr. Crawshay. They seem to me decisive: think once, twice, thrice, as I may, I see no natural means of

producing such chipping, nor do I find flints so notched by Nature in any of the gravels which I have examined. Artificially it can easily be done; the tool produced is one which would naturally be in request to scrape down a stick or a bone; one which, in some form or other, is found throughout all the stone periods.

As soon as I was satisfied of the particular fact that, to the best of my judgment, the hand of man had been at work in chipping some, if not all, of the unbulbed flints, which Mr. Harrison was now amassing in considerable numbers, I endeavoured to put the subject and its issues before my mind in its more general aspects. It appeared to me in the following lights:—

1. The palæolithic implements had hitherto been the earliest acknowledged handiwork of man; but the palæolithic implement is, on the face of it, a very advanced and artistic production. Neither in shape, nor in workmanship does it show any indication of a prentice-hand, and far from being the first-born of human tools, must represent the last stage in a long, long series of artistic development. (On this truth, for so it may be called, Sir John Evans speaks in p. 574 of his great work; and at the discussion on Professor Prestwich's paper, the argument was dwelt on by Gen. Pitt Rivers.)

2. If man, as I believe, has risen to his present position from being a wild animal in the wild forest, there must have been some stage in his progress, which we may call the pre-palæolithic stage– that is to say, he used a stone tool, but he had not the skill which palæolithic man had; he could not break up the hard, intractable, waterless flint of the surface soil into thin, sharp, useful flakes; nor had he the art to shape it into curve and oval, butt, blade, and point, putting into execution a conceived purpose, which contained a conception of symmetry as well as of utility; he simply picked up a stone and used it as it was. Such a tool would become chipped at the edges which were used.

I was not aware at that time that such stones were habitually used by any modern savages. Some years afterwards, Mr. Henry Balfour, the Curator of the Pitt Rivers Museum at Oxford, pointed out to me a stone taken from the hands of a Bushman in S. Africa. This stone had been one of the native's chief implements, yet it shows less sign of use by man than any of those now under discussion.

Nor was there at that time in England a collection of Tasmanian implements. Among those which have recently been obtained by Dr. E. B. Tylor for the Oxford collections, there are several scrapers, artificially chipped at the edge, but broken by nature from the parent rock. They were picked up and so used.

Such tools may habitually be used at the present day. Last August I was staying at Eyemouth in Berwickshire, and there had the pleasure of meeting Mr. John Oliver, a young fisherman, quite as civilised a person as myself. Mr. Oliver had the reputation of making excellent bone needles for mending nets, and he made them by grinding the bone down on an ordinary shore-pebble. This, he said, produced an implement less liable to break than manufactured articles sold in the shops. I could not help reflecting that his method was faithful to very ancient custom indeed.

3. Granting that such an age existed, is it possible to be certain about any relic which it has left behind, or must we hold fast by the dictum, "No bulb, no certainty"?

4. No conclusions could be based on isolated examples, as Nature chips flints as well as breaks them in very strange fashions. Any sound inference could only rest on numerous examples, and some definite types of simple and intelligible tools.

5. Such an age might be expected to be the precursor of the age of palæolithic implements, which were shaped into definite forms and not merely chipped round natural edges; but if we were really on the track of such a time, we should be likely to find some similarity in the forms, some trace of transition from the shapes of the earlier into those of the later time.

6. The acceptance of these flints, their authenticity, rested on the strongest part of the evidence, and did not fall with the weakest part of the chain. I saw in Mr. Harrison's collection a number of flints which, I considered, were and always would be in themselves inconclusive; man or Nature might have formed them, and the prudence of associating them with the others seemed questionable. On the other hand, of some I was quite satisfied; of others, the probability in their favour was so very strong that I felt they should be accepted. Thus the principle was admitted; these types could not reasonably be rejected; the weakness of the others did not affect them, while the weaker class, which still hung in an even balance, received a very strong accession of weight and strength from the necessary admission of the others.

I am not sure that I have placed this line of argument clearly before a reader; but I am quite sure that those who enter closely into the subject will find at some point that they are face to face with the same reflection; the strong cases prove, the weak do not disprove.

Naturally, other complex problems arose, connected with the age and source of the drifts, their relations to each other and to the neighbouring deposits. It was very clear to me, as a practical worker in the field, that the flints on the Chalk

Plateau had a different character and an appearance of greater age than those on the surface of the Lower Greensand around Limpsfield. This struck me very strongly the first time that I saw a bulbed flake from Ash. Similarly I judged that the Limpsfield gravel-pit, standing at 490 level, with one of the sources of the Medway issuing from it, belongs to an older state of things than the raised valley-gravels of the existing Medway. There was at that time a large gravel-bed at Oxted station, about 40 feet above the level of the present stream; it was entirely composed of drift from the pit at the higher level. But at the time of which I write Prof. Prestwich's paper on the relative ages of the river-valley gravels in the Darenth basin[1] was yet unwritten. Most willingly do I confess my obligation to that article for its clearness of view, breadth of treatment, and wealth of facts, obtainable only by long and persistent observations. His conclusions seemed to fit exactly what I had long had before me in the limited area which I was able to study closely. The conclusions were these: that the gravels belong to three distinctly marked epochs; (1) the river-valley epoch, when the rivers flowed in their present limits, but in higher channels; (2) the Greensand epoch, when watersheds were not the same. This was typified to me by the Limpsfield gravel-bed, which now crowns a hill, and gives a source to the Medway on one side and to the Darenth on the other; but originally, like all other gravel-beds, was deposited in a valley and not on a hill-top; (3) the Chalk Plateau epoch, when watersheds were more different still, and the general surface of the ground much less denuded, and very different from its present outlines. This stage, in the Professor's view, was early glacial or pre-glacial, and the great denudation was largely due to the action of glacial conditions.[2]

When this paper was published, the conclusions seemed to me in perfect harmony with the features of the district, but this somewhat anticipates. At the time of which I write I was only satisfied that the beds of ochreous pebbles on the plateau were true drift-beds, which had come from some distance, from above

[1] "Quarterly Journal Geol. Soc.," May, 1891, vol. xlvii.

[2] These conclusions have at least a general resemblance to those to which Mr. Skertchly was led by an examination of the Suffolk district in 1875. His conclusions, published in 1879, among the memoirs of the Geological Survey, were that three periods in the life of Palæolithic man could be traced: (1) the Late Palæolithic, in river valleys, which cut through the boulder-clay; (2) the Intermediate Palæolithic, which belong to an older valley system, running at right angles to the present rivers Lark, Little Ouse, and Stoke; (3) the Early Palæolithic, which are older than the chalky boulder-clay. All three periods Mr. Skertchly considered to be Interglacial, and separated from the Neolithic period by the Hessle boulder-clay, though he gives this conclusion as a "legitimate inference," as the direct evidence of superposition is absent.

what is now the Wealden area, bearing with them the majority of flints now under discussion. In one of the drift-beds at Ash I came upon a perfectly rounded pebble of Oldbury stone, which is a quartzite of the Lower Greensand, and easily recognised. Unless we assume improbable and exceptional suppositions, this pebble must have rolled downwards when the Chalk Plateau and Lower Greensand escarpment were in one continuous slope, and not separated by the present broad valley of the Gault; the Lower Greensand must have risen to a much higher level than it now does. This instance was typical but not isolated, for at several places between Ash and the Chalk escarpment pieces of the same conspicuous stone were found. Similarly the extraordinary wear of the flint pebbles in the large bed at West Yoke impressed me much, as it has every geologist to whom I have shown examples. It had travelled far, and contained many of the supposed implements in indubitable association.

But the first question to settle was, "Were the chipped flints genuine? were they chipped by man?" Here I stood face to face with the saying of Sir John Evans—very probably accepted by myself in a broader meaning than he intended to give it when the words were somewhat casually spoken—at all events a saying which I had previously maintained, and have never been disposed to slight. I felt that the saying could not be maintained. When the bulb has been removed from a neolithic flint, it is not necessarily rejected. Why? Because there is otherwise sufficient evidence of human handiwork. In such cases this usually lies in the flaking; but, I reflected then and believe now, evidence of a human hand may lie in the edges as well as in the flaking. On carefully examining Mr. Harrison's collection I found several examples in which bulbed flakes and unbulbed broken flints could be placed side by side, in which the chipped edge of the one was practically identical with the chipped edge of the other. Two such examples have been drawn by Mr. Tomkin, and are figured in the plate. Figures 2*a* (1599) and 2*b* (2693) feature each other very closely. If one had a purpose, had not the other the same? Now Fig. 2*b* has a bulb, and is undoubtedly of human workmanship. Nos. 3*a* (1221) and 3*b* (1234) are both rude scrapers; 3*b* is bulbed and undoubtedly artificial; can we reject 3*b*, which has rather more signs of use?

Now in the edge the evidence of use by man is to be sought and found; when this, the final result, is identical and peculiar, why should we refuse to believe that the producing cause was the same? Is it not the more probable conclusion, to which not one but several lines of reasoning conduct us? Since that time I have seen in Mr. Crawshay's collection some flints of the same nature, which were very convincing.

Evidence of Transition into acknowledged Types.

At the time of which I write evidence of a transition from the natural flint chipped to the flint artificially shaped or common river-valley type was not striking. On an excursion to Ash with Mr. Harrison we obtained more than one example, which in shape seemed to be true predecessors of the pointed end and heavy butt of the later type. This was a prediction fulfilled, and therefore gave us pleasure. Since that time a considerable series has been obtained. Of these one is figured in the plate: No. 4*a* (1077) is one of the implements which Professor Boyd Dawkins and others reject; 4*b* is an undoubted implement from the L.G.S. escarpment. I think that 4*a* is 4*b*'s very near relation.

In this part of the inquiry two other points deserve notice. The palæolithic workman flaked the weathered surface-flint with wonderful skill by taking off thin flakes right along the surface. In a number of these debated flints the same art is visible, though less in degree; a flake of considerable length is just nipped off the surface.

This line of argument is analogous to the evidence of an adept in handwriting, and from long study of the palæolithic tool of the surface I am disposed to give it great weight. Nature does not adopt this style of chipping, but when chips extend far over the surface they strike deeper. Several such blows together seem to me evidence of the human hand, which it is very difficult to disbelieve.

The next point was brought under my attention by Mr. Harrison. It is that in some of his examples the edges are so regularly chipped as to call to mind the familiar graceful palæolithic curve or sweep.

All these points tend to the belief in a sequence. It is undoubtedly possible to argue that the flints were themselves to begin with similar in shape, some were chipped by nature, others by art; but the present resemblance is entirely due to the original similarity of the untouched pebbles. Here the question of numbers becomes of weight. Nature may work one or two examples in a style which imitates the most inventive of her sons; but Nature will not give numerous examples of definite types, whereas this is precisely what man will do, and because these series of definite types have appeared we do believe them to be the work of man. Grant, as I do not, that to start with the probability on either side was even, with each succeeding example of similarity in definite types the scale falls down, down, down in favour of a purposeful, reasoning agent and against accidental Nature.

The curved flints or drawshaves also find their representatives

in the flakes with hollows in the side, which occur in all river-valley gravels, and were probably used for rounding wood or bone. The analogy is not at first apparent, because the curved flake is thin and much more suitable for the purpose than the thick, curved scraper. Yet in either case the essential is the same, a rounded curve with a used edge.

A number of ovoid forms from the plateau also do very much feature the ovoid implement of river-valley type. In this case, however, I thought and still think that the natural form of the pebble is too important a co-efficient to be ruled out of the result. The ovoid is the common form of the unworked stone, and if the edges are altered either by man or by Nature, this form will appear by necessity rather than by purpose. This may appear hypercritical; it is, however, based on local experience. In the implements of my local collection I found that the true oval was a very rare form, whereas the ovoid was very common.

Blunt Edges a Difficulty.

Sir John Evans very rightly pointed out what has always been a difficulty. The edges of the so-called scrapers are so blunt, or rather rectangular, that it is hard to see what purpose they could have served which could not easily have been better obtained by a sharper tool. I have always felt the force of this objection, and do not profess to have solved it. The only solution known to me, that the people who used these tools were at once very stupid and very muscular, is unsatisfactory, and I allow to the full the novel appearance of the rectangular scraper. At the same time the difficulty of seeing only Nature's hand in working so regular and examples so numerous is to me a greater difficulty. Nor can we expect that in subjects so distant from our experience everything is to be perfectly plain. Even neolithic types, such as the Scotch hexagonal balls, are perfect puzzles, and unexplained neolithic accidental forms are common. We can only guess at the use of certain palæolithic forms. Why was the ogival curve so elaborated? What special purpose could have been served by a short and thick subtriangular implement, with jagged edges? In truth we do not know, but we do not doubt the implements. So with blunt edges; they are a difficulty, but they are in respectable company. One of these blunt-edged examples is figured, No. 8 (1440). The chipping of the edge, the handle in the butt, are so purpose-like, that I certainly am unable to see here only Nature's hand. Further, these remarks do not apply to all the scrapers. Some of them, especially those formed from split pebbles, closely resemble the orthodox palæolithic scraper.

Such or nearly such was the aspect in which the question appeared to me at a time when I was not aware that anyone

except Mr. Harrison was fully persuaded of the human origin of the flints. The conclusion was against my previous impression, forced upon me by further consideration, so that it was with a kind of relief that I heard that Mr. Spurrell and Professor Prestwich had also accepted the implements as genuine. I have now reason to believe that their decisions, as well as Mr. Crawshay's, were made before I was aware of it, and I distinctly wish to disclaim any assertion of priority or originality, except the humble part of deciding for myself on intelligible reasons. At present the question stands on very different merits. A great variety of types has appeared, which have been detailed by Professor Prestwich, Mr. Harrison, and Mr. Crawshay, and these types, as Professor Prestwich remarks in a private letter, have not appeared as the work of Nature in any known gravel whatever, a circumstance which somewhat shifts the *onus probandi* to those who would reject them. That the flints as a class should meet with opposition when first brought before the public was inevitable; they had met the same before they were brought forward. Indeed criticism was to be desired; but that they should be rejected at a hasty glance or without full examination is neither inevitable nor desirable.

While these discoveries were "in the making," it was certainly for a long time my belief that no true palæolithic implement was found in association with the gravels in which the chipped flints appeared; that thus the chipped flints represented an age by themselves. This view proved untenable, as in the course of time a few very weathered and worn examples of definite palæolithic implements were found in the gravel-spreads. It was also my view that the drifts in which these very ochreous flints occur could be differentiated from neighbouring drifts in which rude implements were also found; so that it was with some disappointment that I found Professor Prestwich unable to take this view. Still, as has been shown above, the nature of surface finds leads us to look for various ages among them; some drifts may be older than others, and certainly the plateau contains much of later age than its earliest drifts.

What then is the conclusion? It is this; that in the ochreous drift, which can be found sticking in the edge of the broken Chalk escarpment, and traced for miles along the gently-sloping surface, man appears using the palæolithic axe, but using much more largely tools of a ruder and simpler type, which point back to a previous time when he was unable to shape his tools to a form already conceived by his mind. The axe seems to be the latest modern improvement; the others to be the survival of the usage of an earlier time. This may appear tame, but is it not as interesting as it is probable? It seems to introduce us to man of

the earliest date at which we know of his presence in our now island-area, and to represent him as a human being, very like ourselves, improving in his methods, but clinging still to the custom and wont of bygone days.

It is not right, but it is very natural to ask: What consequences will follow should the authenticity of these flints be accepted? Do they force us to believe that on the Chalk Plateau of the North Downs relics still remain of a race of mankind hitherto undiscovered? Has a rival arisen to the "indivisible supremacy" of palæolithic man? Did this ill-equipped race precede the axe-armed race, and succumb to his improved weapon? Doubtless such a view may be held, but it is by no means necessary, and rendered improbable by the occurrence of true shaped axes in the worn and ochreous drift. The argument does not seem to lead us into any sensational or disturbing conclusion, but rather to one which might have been expected. We know of early man that at an early date in Pleistocene time he was already established in a similar state of material progress, in India, in Africa, and in Western Europe. This extension in itself demands a previous human existence of immense duration. Man did not spread his dominion over three continents by steam and rail, but *pedetemptim progrediendo;* foot by foot, and field by field, the earth was won. Of man in this long epoch we know as yet nothing certain; we can only hope to learn by the discovery of human relics or tools with associated animal remains of early types. The Chalk Plateau is not likely to contain any such secret; the denudation has been so great; the formation of red clay so slow. No, not on the North Downs; perhaps in some sheltered fold of

> "Imaus,
> Whose snowy ridge the roving Tartar bounds;"

not in the Thames valley, but perchance in

> "the plains
> Of Sericana, where Chineses drive
> With sails and wind their cany waggons light,"

some happy discoverer will light upon evidence which brings us nearer to the beginnings of human existence. As yet we have a long period when man lived and spread, and we possess no knowledge either of his form or of his handiwork. Even the river-valley period was of very great duration. Sir John Evans, in his monumental work, says that "at one time I thought it probable that a marked distinction might eventually be drawn between the high and low-level implements; but, as far as Britain is concerned, this can hardly be done."[1] Here I think these dis-

[1] "Ancient Stone Implements of Great Britain," p. 616.

coveries do advance a step. The more closely the area of the Greensand and the Chalk Plateau is examined, the more firmly, I believe, will every one of Prof. Prestwich's conclusions be established —namely, that, in this area, a distinction can be drawn; three geologic stages may be traced and two archæologic stages: (1) the age of the denudation of existing river-valleys; (2) the Lower Greensand age, geologically distinct, but to the archæologist, similar, as the implements in use are of river-valley types; (3) the Chalk Plateau age, when the implements are as a whole of a ruder type; and (4) that the chipped flints are, as a class, and in their great majority, the authentic handiwork of man.

Thus the argument leads us to the verge of an epoch, which, judged by its consequence, the dispersion of mankind, must have been of longer duration than the river-valley period. Probably during this epoch, under various local influences, divers stocks of mankind grew slowly into separate races. Of this the plateau-finds—accept them in all fulness—tell us nothing; but after thinking many times, and with great and grateful consideration for any opinion of Sir John Evans, I do believe that they lift the veil for a moment beyond the time when the tools of the river-valley type were in universal use; and that Mr. Harrison, their discoverer, has, to borrow a metaphor from the neighbouring shade of the Bodleian, deciphered from the hard palimpsest of earth another page in the most interesting of all epics, the story of human life.

A CRITICAL STUDY *of the* COLLECTION *of* CRANIA *of Aboriginal Australians in the Cambridge University Museum.* By W. LAURENCE HENRY DUCKWORTH, B.A.

Material.—The number of crania is, in all, thirty-eight, and of these, twenty-nine are crania of adults, five of aged persons, and four of youths.

Sex.—Of the adults, five are females and twenty-four are males. The five aged are all males. Of the four young skulls, two belonged to youths of about eighteen to twenty years of age, one a child of seven or eight, and one a young female of about twelve or thirteen years.

INTRODUCTORY FOOTNOTE.

A description of these skulls was commenced by Prof. Macalister, and the present writer has had the benefit of Prof. Macalister's notes and measurements. The notes have been incorporated in the craniological part, and the measurements were revised and added to in the craniometrical part of the present work, which is thus an extension of that begun by Prof. Macalister.

Geographical classification.—Ten specimens are from South Australia, and with ten skulls of "Murray" natives, form a group of twenty South Australians.

Six specimens are from New South Wales and four from Victoria, two from Western Australia, one from the Northern Territory of South Australia, and one from Melbourne (but the exact locality whence the last was obtained is not recorded).

Of the source of four specimens, three of which accompany complete skeletons, there is no record.

State of preservation.—The state of preservation varies widely as may be gathered from the tables of measurement, and from the detailed descriptions of the individual specimens.

Plan of work.

Measurements were made and tabulated.

A carefully detailed description of each specimen has been written, describing the age, sex, state of preservation and appearances presented in the several *normae*: individual peculiarities were recorded. This series of descriptions follows the numerical order of the Cambridge catalogue, without regard to the grouping of the crania according to districts or tribes.

Tables I and III.

i. *Discussion of the measurements.*—These, which number about forty-six, are arranged in a table of general measurements, and the corresponding averages are arranged in another table.

Tables II and IV.

ii. For skulls upon which all the above measurements could be made, a series of thirteen indices has been made out, the number of indices varying for skulls which are not complete: the averages of these indices are arranged in a separate table.

Tables V, VI, VII.

iii. Tables of additional measurements are three in number, and comprise:

(α) Measurements of the mandible.
(β) Miscellaneous: lengths of sutures, &c.
(γ) Dimensions of teeth (two tables).

And for these the averages are arranged in the respective tables.

Tables VIII and VIIIa.

iv. Special tables present the measurements of certain groups of crania, viz., all those of South Australians; all those from New South Wales; and all those from Victoria. In these tables the indices and a limited number only of measurements will be found.

Table IX.

v. The method of seriations has been applied to the whole series of indices and to the indices of the group of South Australians. Also to a few of the principal measurements of the same.

Table X.

vi. All the averages of the measurements made have been reduced to the figures which present their relationships to the average basi-nasal length taken as 100. (This of course has already been done for the basi-alveolar length in calculating the alveolar index of the averages.) This table is divided into four columns which correspond to the four columns of the table of averages (Table III). In a subsidiary table are appended the corresponding values as calculated for series of (1) Andamanese Islanders; (2) Fijians; (3) Islanders from Torres Straits; these are taken from Sir William Flower's memoirs in the "Journal of the Anthropological Institute."

Table XI.

vii. The frequency of the occurrence of a certain number of characters such as the epipteric bone, third condyle, &c., was observed and the results have been tabulated.

Table XII.

viii. All the available figures representing the average cubic capacity, cephalic and other indices, have been brought together into one table, so that for instance the average cubic capacity is calculated from 150 cases. The authors whose memoirs have been referred to in this connection are—

Dr. Barnard Davis ("Thesaurus Craniorum").
Sir William Flower ("Journ. Anth. Inst." and "Cat. Roy. Coll. Surgeons").
Sir William Turner ("Challenger" Report).
MM. Quatrefages et Hamy ("Crania Ethnica").
M. Cauvin ("Bull. Soc. Anth. de Paris," 1883).

Table XIII.

ix. Is an additional table, which is really a seriation, and as such will be discussed with the other seriations of Table IX.

Tables XIV and XV.

x. Two skulls have been longitudinally bisected: measurements made on "rubbings" of these have been tabulated with the corresponding measurements made on rubbings of similarly bisected skulls of anthropoid apes and other animals. In the same table are the corresponding measurements made by Sir William Turner on similarly treated skulls of Australians.

N.B.—The skulls of three adults and one aged males present considerable divergences from the usual type. They will be referred to as "doubtful" skulls and the averages of the male skulls, *without* these four "doubtful" skulls, have been arranged in a special column throughout the tables.

Descriptive part.—The work has been resolved into a series of descriptions (craniological) accompanied by measurements (cranio-metrical part). Besides the detailed descriptions, a series of short notes have been written, describing individual peculiarities. From the whole series of descriptions, that of the typical skull has been deduced, and this differs in no important respect from those already published.

Measurements: Explanatory details.—Measurements were made with a craniometer (Flower's) graduated in millimètres, and with a steel tape; and the cranial capacities were estimated by using No. 8 shot, which was arranged by shaking the skull and occasional use of a wooden rammer. The mean of two observations for each specimen, not differing by more than 10 c.c., has been recorded: exceptions to this rule must be made with regard to very imperfect skulls.

Other measurements were made in the usual way. The jugo-nasal breadth and arc are measured according to the directions of Oldfield Thomas in the "Journ. of the Anth. Institute," vol. xiv. p. 333. The anterior palatine breadth is that between the roots of the canine and first premolar teeth; the posterior palatine breadth that between the first and second molar teeth. The horizontal circumference did not include the greatest prominence of the glabella.

Discussion of the tables.—Looking over the facts presented by the various tables, in Table I it may be noticed that the average cranial capacity of twenty-six specimens of both sexes is 1252 c.c. The average capacity of the male skulls is 1269·9 or 1235, according as the four doubtful skulls are included or not. These values accord fairly well with those recorded for other series (by Turner, Flower, and others).

The maximum length exceeds the ophryo-occipital length by a good deal more in the males, than in the females, and thus gives an indication of the greater and more frequent prominence of the glabella in the former sex.

The maximum breadth was usually on or about the parieto-squamous suture, but in one or two instances considerably below this.

The difference between the two sexes is clearly shown in the relative magnitudes of the bi-asterial and bi-stephanic breadths, for in the males the bi-asterial distinctly exceeds the bi-stephanic breadth, whereas in females the two are about equal, the bi-

asterial breadth in females being smaller rather than the bi-stephanic breadth being greater than in males.

As regards the measurements indicating facial breadth (*i.e.*, the external bi-orbital, bi-zygomatic, bi-malar and other breadths) the males exceed the females by very little, except in the case of the bi-zygomatic breadth; in this the difference between the sexes is pronounced, and is doubtless related to the greater mass of muscles working the lower jaw, and occupying the zygomatic fossa, of males. It must be admitted that this comparison is only drawn from *three* female skulls, but it is borne out by the dimensions of female skulls in other collections.

The bi-zygomatic, besides exceeding the other measurements of facial breadth, often nearly coincided with the maximum parieto-squamous breadth of adult males, but in the young skulls was much below that breadth. This again indicates the relative size of the masticating muscles in the two cases.

Height.—The basi-bregmatic height, in most cases, is slightly smaller than the maximum parieto-squamous breadth. This will be referred to later in connection with the group of skulls from South Australia.

The palato-maxillary length is very great in several specimens; the mean value is considerably affected by the presence of the four "doubtful" skulls.

The comparative lengths of the frontal, parietal and occipital arcs respectively are of considerable interest in view of the generalisations of M. Cauvin on this subject. ("Bulletin de la Soc. Anth. de Paris," 1883, p. 253.) This writer states that in the crania of Australians (and of Papuans and Melanesians), the parietal arc exceeds in length the frontal occipital arcs. In thirty-one specimens of both sexes described by Sir William Turner, the frontal and parietal arcs of eight (five males, three females) were almost equal in length; in twelve (eight males, four females), the frontal was in excess; in eleven (seven males, four females), the parietal was in excess of the frontal.

In the Cambridge collection, out of thirty-three skulls of both sexes, the frontal and parietal arcs of three (two males, one female) were of equal length; in fifteen cases (thirteen males, two females), the frontal exceeded the parietal; in fifteen cases (fourteen males, one female), the parietal exceeded the frontal arc.

Combining all these with the additional cases cited by Sir William Turner (in vol. ii of his report) it appears that of sixty-nine skulls of adults of both sexes, the frontal and parietal arcs are of equal length in eleven cases, the frontal is in excess in twenty-nine cases, and the parietal arc is in excess in twenty-nine cases also.

With regard to the occipital arc: in thirty-four cases out of thirty-six recorded by Sir William Turner, the parietal arc exceeded the occipital; in the remaining two (a male and a female) the occipital arc exceeded the parietal.

Of thirty-one cases in the Cambridge Museum, the parietal was greater than the occipital in twenty-nine, less in two (both males). So that in sixty-seven cases, the parietal arc exceeded the occipital in sixty-three. So that in this respect M. Cauvin's generalisation holds good.

But as regards the frontal and parietal arcs, it appears from a study of sixty-nine skulls of adults of both sexes from the Cambridge and Edinburgh collections, the two arcs are unequal nearly five times as often as not, and that when unequal the frontal arc is just as often the longer of the two as not. So that there is no confirmation of this part of M. Cauvin's statement.

Oblique parietal arc (*Macalister*).—Mention must here be made of the measurement called by Professor Macalister the "Oblique Parietal Arc." Its plane lies in the general direction of the fissure of Rolando. The mean value in this series is remarkable as being nearly the same for both sexes. No other large series of this measurement are as yet on record, but the following may serve as examples met with in the Cambridge collection.

Australians	343 mm.	av. both sexes.
A Tasmanian	336 „	
N. A. Indians	365 „	av. of 3.
Negroes	368 „	av. of 5.
New Zealanders ..	368 „	av. of 3.
Ancient Peruvians ..	371 „	av. of 5.
Modern Europeans ..	370 „	av. of 2.
Kaffirs	375 „	av. of 5.
A Carib	375 „	
A Murray Islander ..	375 „	In the Liverpool Museum.
An Eskimo (male) ..	384 „	

Mandible.—The mandible accompanies the cranium in eighteen specimens. The measurements show the excess of the average dimensions of the male over the female mandible. In both the coronoid and condylar heights are nearly equal; in both the intergonial exceeds the gonio-symphysial length, the excess being more pronounced in male jaws.

Average Indices.—The average indices have been calculated in two ways and the results arranged in two tables (IV, and IV*a*,) one containing the averages of the indices in distinction from the indices of the averages arranged in the other; the former

though less correct, has the advantage of admitting a greater number of instances, and the differences between the two tables will be found for the most part insignificant.

Breadth Index.—The mean breadth index of thirty-eight specimens is 70·5; of twenty-nine males 70; of five adult females 72·9. Four specimens are above the upper limit of dolicho-cephalic skulls (three males, one female); the highest individual index is 76·6, which with the second highest 76, belongs to "doubtful" skulls. Without the four doubtful specimens, the mean breadth index of twenty-five males is 69·2. The lowest index is 64·9, that of the cast of the skull of King Rufus Billy (a Murray native); though the exact state of the sutures of this scapho-cephalic specimen cannot be ascertained, the sagittal appears to be free from synostosis. The next lowest index is 65·9 (No. 2112, in which sagittal synostosis is nearly complete).

Vertical Index.—The mean vertical index of thirty-four crania is 69·6; that of twenty-six males 69·8; that of three females 68·6. The mean height of twenty-five male skulls is 130·5 mm. and their mean breadth is 132 mm.; of four females the mean height is 121 mm., the mean breadth is 128 mm. Altogether the series of skulls is dolicho-platycephalic.

Gnathic Index.—The mean gnathic index of twenty-nine skulls is 101·2, of twenty-two males 101·8, of three females 102·7. Here again the doubtful skulls disturb the average, for when excluded, it is found that the mean index of nineteen males is 102·15. The highest individual index is 108·7 (a South Australian male, No. 2115). From the averages, the whole series and the skulls of each sex fall within the mesognathous group.

Nasal Index.—The mean nasal index of thirty-two skulls was 55·6, of twenty-six males 55·4, of two females 53·25. They fall within the platyrhine group. The highest individual index is 65·1, and one of the "doubtful" skulls possesses the lowest nasal index of the series, viz., 47·4.

Orbital Index.—The mean orbital index of thirty-one skulls is 82·6: that of twenty-four males 81·2; of three females 87·4; accordingly the males are microseme, the females mesoseme. One of the doubtful skulls has an index of 92·7: after exclusion of the four doubtful skulls the mean index for twenty males is 80·5.

Palato-Maxillary Index.—The mean palato-maxillary index of twenty-nine skulls is 111·7; of twenty-two males 110·4; of three females 112·6. Among the males, in four cases a low palato-maxillary index is associated with a high degree of prognathism, the two most pronounced cases being

Skull.	Palato-maxillary Index.	Gnathic Index.
No. 2115	101·5	108·7
„ 2127	92·2	107·1

On the other hand the very dolichuranic skull No. 2140 with an index of 97 has a gnathic index of but 100.

Palate Length.—It might be mentioned in this connection that the comparatively low palato-maxillary index in many Australian crania is due to excessive length rather than reduced breadth; but this palatine length is much increased in many cases by a large tuber maxillare; herein, it is thought, lies a difference between these crania and the dolichuranic crania of anthropoid apes; for in the latter (in the majority of instances, so far available) the maxillary tuberosity is frequently quite insignificant and does not add to the palatine length, so that in this respect the palate of anthropoid apes resembles that of the more highly civilised races of man rather than the aboriginal Australian.

Total Facial Index.—The figures for the total facial index do not accord very well with those published by Dr. Topinard ("Et. d'Anth. Gén.," p. 919), where 107·2 is given as the mean index of seven Australians. In the Cambridge collection the mean index of fourteen skulls is 95·4, of ten males 96·2, of two females 93·6; and in the whole series two males out of ten only have indices above 100. The general indication then is of a longer face than that of the Australians referred to by Topinard. For the superior facial index of Broca, nineteen skulls give an average of 73·4, thirteen males of 73·7, three females 74·1. Topinard, quoting Broca's figures, gives 69·7 as the mean of twenty-seven Australians. Sir William Turner's "Challenger" Report contains figures which give 65·1 as the mean index of twenty-eight skulls. Both these observations denote faces shorter than those of the skulls in the Cambridge collection. Sir William Turner's series contained only three skulls from South Australia, whereas the majority of the skulls here described are from that district, and none of these presents an index below 71.

Facial Indices.—It might be supposed that this is a feature characteristic of skulls from South Australia, but it must be admitted that no great reliance can be placed on such an index as this, depending as it does on the position of the ophryon. The superior facial index of Kollmann avoids this difficulty, and it is interesting to find that here again the indices of the skulls

at Cambridge indicate a longer face on the average than do the indices calculated from the data furnished by Sir William Turner in the memoir already referred to. (Thus, the mean index of twenty-one skulls is 51·7, of fifteen males 51·8, of two females 54. Turner's figures give 48·8 as the average of thirty-three skulls, of twenty-one males 48·6, of nine females 48·9. Again the average index of eleven skulls from South Australia in the Cambridge collection is 52·2.) To sum up the facts presented by these facial indices. From three facial indices evidence appears that the skulls in the Cambridge collection, in which South Australians predominate, have a proportionally longer face than those from other districts. The relation of this feature to prognathism cannot be overlooked, and perhaps the difference between the South Australians and other series may be too slight to warrant any conclusions being drawn; but the recurrence of the same difference in three indices respectively, is remarkable.

The average stephano-zygomatic index (of Topinard) indicates that the skulls are highly phaenozygous, the males more so than the females. (Average index of twenty-one skulls is 79·9, of fifteen males 76·5, of three females 81·9.) The mean gonio-zygomatic index of fifteen skulls is 72·9, which agrees fairly well with the figure quoted by Topinard, viz., 75·5 as the average of four Australians.

Naso-Malar Index.—The naso-malar index is of considerable interest owing to the small range of variation throughout this series. The range through twenty-seven skulls is less than 7 units (the range of the cephalic index through twenty-nine males being nearly 12 units). The average index of thirty skulls is 111·4, of twenty-three males 111·2, of three females 110·4. In his paper in the "Journal of the Anthropological Institute," vol. xiv, p. 333, Oldfield Thomas gives 111·1 as the mean index of sixteen Europeans. One would expect the average value for the modern European skull to be somewhat greater than this, or else that of the aboriginal Australian to be somewhat lower.

Dental Index.—The mean dental index of thirteen skulls is 45·2, of eight males (excluding the doubtful ones) 45·8, of two females 49·25. The fact of the female sex possessing the higher index agrees with the figures recorded by Sir William Flower, viz., 44·8 as the average of twenty-two males, 46·1 the average of fourteen females. The relatively smaller basi-nasal length in the latter sex probably is the cause of this apparent discrepancy.

Table VI.

Of the tables of additional measurements but little can be said at present. With regard to the dimensions of the posterior

nares, it may be remarked that while the breadths are nearly equal, the height is only one-half that of the apertura pyriformis of the nose.

The average least distance of the temporal crests is 87·5 mm. (for twenty-two males), and in three females they did not approach nearer than 106 mm.

Teeth.—As regards the dimensions of the teeth, the combined lengths of the lower molars exceed those of the upper set, and the same relation holds good for the combined lengths of molars and premolars. This confirms the statements of Professor Turner in the "Journal of Anatomy and Physiology," vol. xxv, p. 461. With regard to other statements in the same paper, viz., those referring to the apposition of the teeth, the confirmation is not so clear. Professor Turner makes the statement concerning a skull from South Australia, that the two sets of teeth are in contact by their cutting edges "when the condyles of the lower jaw were articulated, and placed in contact with the ridge that bounded the back of the glenoid fossa, and the teeth clenched."

The following specimens at Cambridge were available for examination with regard to this point, and the following notes present the results of such an investigation:—

No. 2,101. South Australia (a cast and not the original skull). When the condyles rest in the glenoid fossa, no such apposition as was described is observed; on placing the mandible in such a position that apposition occurs, it is found that the condyle is resting on the rounded *anterior* border of the glenoid fossa formed by the anterior root of the zygoma. This might well be the position in life, as room would be afforded for the interarticular cartilage.

No. 2,115. South Australia, male.

The lateral superior and two left lower incisors only persist. On placing the jaw in the desired position firmly, the condyles are found *not* to be in contact with any part of the floor or boundaries of the glenoid fossa, being separated by an interval of less than 1 mm., which was presumably occupied by the interarticular cartilage.

No. 2,128. South Australia, male.

Arrangement very similar to No. 2,115, but the right condyle just touches the anterior border of its glenoid cavity.

No. 2,137. When the mandible is placed in the position in which the incisors bite surface to surface, a considerable area of the condyles is found to touch the glenoid fossa. It is here to be remarked that the glenoid fossa of this specimen are very shallow and flattened, the flattening being most pronounced in the region of the anterior border of the cavity, so that the

anterior root of the zygoma is indistinct. It is submitted that such a shallow glenoid fossa is an approach to a state that is usual in anthropoid apes. (Among Australian crania Nos. 2,138, 2,139 and 2140, exhibit the same feature in a less marked degree.) But even here the condyles are not touching the back of the glenoid fossa when the teeth are in apposition.

No. 2,138. Approaches most nearly to the state of affairs described by Sir William Turner. Apposition still occurs when the condyles are in the posterior part of the glenoid fossa.

Nos. 2139 and 2140. Give no very definite evidence, but it seems as if the condyle must occupy an *anterior* position in the glenoid fossa in order that the teeth may be in apposition. The influence of the size of the interarticular cartilage in determining this position has been hinted at by Topinard ("L'Anthropologie," 1892). With regard to the occurrence of this apposition of incisors in races other than Australian, Sir William Turner remarks that he had observed it in a Malay, a Bushman and an Esquimaux, while in 1860 Sir John Lubbock wrote in an account of the Danish kitchen-middens (in the "Natural History Review"), "the tumuli have supplied us with many skeletons of this period . . . . one curious peculiarity is that their front teeth did not overlap as ours do, but met one another, as do those of the Greenlanders at the present day. This evidently indicates a peculiar manner of eating."

Further with regard to the occurrence in prognathic or orthognathic skulls, it may be mentioned that the same arrangement was observed in a very orthognathic skull dug up at Chester, during the last few months. It must be added that this specimen gave signs of deformation (though not posthumous) which may be responsible for the appearance of orthognathism.

The group from South Australia.—Table VIII exhibits the indices and a few of the principal measurements of the group of skulls from South Australia, which form so large a proportion of the Cambridge collection. The chief point of interest is in the relative magnitudes of the cephalic and altitudinal indices. Considering averages, the breadth index is 70·2; the height index 68·9; the average skull is therefore dolicho-platycephalic. As regards the sexes, the mean breadth index of fifteen males is 69·6, the mean height index of twelve males is 69·15 (no appreciable difference); the three females, however, have a breadth index of 71·4 and a mean height index of 65·2, and so are very dolicho-platycephalic. Regarding now individual indices, the results as regards the males are different. In thirteen cases out of seventeen, the height index was less than the breadth index (of these, nine were males, three females, one

a youth). Sir William Turner says that of twenty-two crania from South Australia which he examined, seventeen had a lower height index than breadth index. This is exactly the same proportion as in the Cambridge collection. Combining the two sets of data, from a total of thirty-nine crania from South Australia, thirty are dolicho-platycephalic (nineteen males, ten females, and a youth); in two, the two indices are equal; in seven males the height index exceeds the breadth index.

As regards other indices, the gnathic is somewhat higher in this group than in the whole series and the facial indices, as has been said, show a longer face to exist in this collection than in the skulls from other districts. With regard to the frontal, parietal and occipital arcs, their relative lengths are much the same as in the whole series. (Combining the measurements given by Sir William Turner of South Australian skulls, with those in this collection, it appears that of twenty-three skulls, in three the frontal and parietal arcs are equal, in nine the parietal arc is the greater, in eleven the frontal, the occipital exceeding the parietal in two cases, and the frontal in one.) From this review of the features of crania from South Australia, it must be admitted that no other striking feature other than the occurrence of dolicho-platycephalic skulls, distinguishes them from aborigines from other districts. At the same time there is a slight difference in their facial indices, which may also prove distinctive.

Groups from New South Wales and Victoria.—The Table VIII*a* refers to the measurements of the groups of skulls from New South Wales and Victoria respectively; they do not contain sufficiently large numbers to justify any general conclusions.

Seriations.—Table IX. The method of seriation of characters has been applied in many cases without modifying the value of the averages as already calculated. There is, however, one notable exception, viz., the vertical or height index of the group of crania from South Australia. By examining the factors of this index, the basi-bregmatic height was found to be the disturbing element, and in consequence its seriation was carefully studied, figures relating to twelve well-authenticated male skulls being used. (Average height=129·25 mm.) In forming a seriation with 5 units as its modulus, it was found that the crania fall into two groups almost symmetrically arranged with regard to the average figure, the groups being characterised by basi-bregmatic heights greater or less than about 129 mm. respectively.

The small number of skulls renders this statement somewhat unimportant. By collecting all available data, the total number of adult male South Australian skulls was raised to twenty-four; and in a similar seriation the same grouping is again observed,

while it is much more marked when the modulus is 2 units (the diminution in this respect being justified by the increased number of specimens under consideration).

It may be urged that the choice of the modulus (2 or 5) whereby these features were brought out, was quite arbitrary, and this indeed is the case. It seemed then that a modulus of a different dimension should be taken and as in the actual measurements, no less difference than 1 millimetre is taken account of, the choice of unity as modulus would be somewhat less arbitrary. Arranged in seriation thus the arrangement is somewhat obscure, and if plotted out in the form of a curve, the curve is now discontinuous, whereas with 2 as the modulus it was quite graphic. Still a trace of the same arrangement remains and the whole subject is thought worthy of notice.

The interest of this double grouping lies in the fact that according as a skull falls within one or the other group, so it is (at any rate in 80 per cent. of cases) dolicho-platycephalic, or the reverse.

If the race were homogeneous, one would expect the curve of the number of examples to rise gradually, attaining its maximum at the average (*a*),

whereas in the case of these male South Australians the curve occurs to be of this sort (*b*),

two groups being observed. It seems then as if the dolicho-platycephalic individuals form a section only of the natives of South Australia. The number of cases (24) here considered is perhaps small, but the constant way in which the double maximum has been seen, first with twelve cases, then with twenty-four, warrants some amount of attention being paid to this method of grouping. At any rate if confirmed it would be a very graphic indication of the mingling of two types, and this is perhaps not far removed from what might be expected in the case of the South Australians, where an admixture of a Melanesian with a Tasmanian element is already suspected. To sum up, while the average male skull from South Australia is feebly dolicho-platycephalic, a study of individuals shows that few present this characteristic of the average skull, and that in fact they are either distinctly dolicho-platycephalic, or decidedly

hypsi-cephalic. If both these types were met with in equal frequency, the average skull would have breadth and height indices equal. Actually, however, for twenty-four male skulls examined, the decidedly dolicho-platycephalic class are somewhat in excess of the decidedly hypsi-cephalic class (viz., 14 : 10) so that the average skull turns out to be as already said, feebly dolicho-platycephalic.

At the risk of rendering this discussion tedious, it must be said that the fact of a *single* character being the basis of an argument affecting the race, was considered unsatisfactory, and it was thought that some confirmation of the groupings ought to be obtained from a study of other characters. At first, a number of seriations were made out for other characters, and it may be said at once, without any evidence of a decided nature being brought out. Next the specimens were arranged in order of size, as regards indices and several dimensions. This is in fact another kind of seriation. The difficulty occurred that among the twenty-four skulls the differences between the third, fourth, and fifth, for instance, with regard to any character (*e.g.*, maximum length), might be much less than the differences between the twenty-second, twenty-third, and twenty-fourth in order. So that this table proved somewhat fallacious and certainly unwieldy.

Accordingly a modification was introduced (and I am much indebted to my friend Mr. P. E. Bateman, of Jesus College, for aid in this arrangement) whereby the range of variation in the magnitude of each measurement or index was divided into six equal portions (the number six happened to be convenient, but is quite arbitrary), and all skulls whose dimensions placed them in the same division were regarded as occupying the same place in the order of the specimens. Thus there might be two specimens in the first rank, five in the second, and so on. Table XIII presents the arrangement.

With such an arrangement, one would expect to find differences emphasized, if any exist. Also the curves corresponding to the figures would be expected to show signs of groups, if such are present. But as a matter of fact this particular arrangement does not admit of any statement as to groups being made, and the corresponding series of curves indicates a *double grouping in the case of basi-bregmatic height*, but in this alone, among the most important measurements studied. Next the corresponding set of figures was worked out for the *average* South Australian (as inferred from average dimensions) and the average Tasmanian. A comparison of these with each other, and with the individual South Australians, has so far only resulted in showing that one skull from South Australia (No. 2,114), besides its superficial

appearance, is in proportions nearly allied to the *average* Tasmanian type. As the whole of this method of seriations aims at the bringing forward of the individual characters, rather than those of the hypothetical average skull, no great importance ought to be attached to the last observations. It is very probable that when tables similar to Table XIII have been made out for an equal number of individuals from Tasmania on the one hand, and other districts in Australia on the other, important results may accrue.

Measurements in terms of Basi-nasal lengths.—Passing to Table X. Here are arranged the principal measurements expressed in terms of the basi-nasal length. They have thus most interest in comparison with other groups of crania whose measurements have been similarly modified. Such are the groups of Andamanese Islanders and Fiji Islanders in the memoirs of Sir William Flower, and the group of Torres Strait Islanders described by Oldfield Thomas, in the "Journ. of the Anthrop. Inst." Table XA. Adult males of these groups are arranged in a comparative table, with the adult male Australians. The most striking features are these: the micro-cephalic character of Australians is emphasized; the basi-bregmatic heights of Australians and Fijians contrast strongly (the latter being the higher of the two), the Torres Strait Islanders hold an intermediate position in this respect. The small bi-auricular breadth of Australians is to be noticed as well as in the relative lengths of frontal and parietal arcs, where again there is no confirmation of the statement that the parietal arc is the greater in Australians. The basi-alveolar length has been discussed as the gnathic index; here it shows a less prognathic face than those of Fiji or Torres Strait Islanders.

Concluding Tables.—In concluding this paper, attention is directed to the table which gives the averages of several indices as collected from all available sources, notably the average breadth index of 214 skulls of both sexes being 70·95, the average height index from 171 skulls being 71·5. Finally the Table XI presents details of an anatomical nature referring to the occurrence of what are regarded as anomalies in European crania; possibly the traces of a third occipital condyle and of a divided occipital bone are the most significant.

The Tables XIV and XV having reference to measurements made on rubbings of longitudinally bisected skulls of Australians, Europeans, and also of apes and lower animals, are of considerable interest which is of a general zoological nature, rather than anthropological. These measurements will therefore be considered apart.

Number of Skull.	*2101*	*2102*	*2104*	*2105*	*2106*	*2107*	*2108*	*2112*	*2113*	*2114*
Age	Adult.	Adult.	Adult.	Adult.	Adult.	Aged.	Adult.	Adult.	Adult.	Aged.
Cubic capacity	(?)	1155	1080	1368	(?)	(?)	(?)	(?)	1340	1275
Maximum length	202	181	175	191	186	193	187	182	189	185
Ophryo-iniac length	195	173	166	180	170	185	174	174	186	173
Ophryo-occipital length	194	175	173	190	180	189	184	178	185	178
Maximum breadth	131	127	128	135	132	132	137	120	130	139
Bi-asterial breadth	119	106	104(?)	110	108	108	112	101(?)	114	108
Bi-stephanic breadth	99	107	96	109	111	93	107	77	95(?)	103
Bi-auricular breadth	117	110	112	115	(?)	114	115	112(?)	112	117
Minimum frontal breadth	93	93	89	101	97	102	104	79	88	95
External bi-orbital breadth	120	108	97	110	111	110	111	105	108	109
Bi-zygomatic breadth	140	(?)	126(?)	132(?)	(?)	(?)	(?)	(?)	132	133(
Bi-malar breadth	128	117	(?)	119	(?)	(?)	(?)	(?)	121	116
Bi-maxillary breadth	102	91	87	95	(?)	(?)	(?)	(?)	103	87
Jugo-nasal breadth	117	99	(?)	97	(?)	(?)	(?)	(?)	101	99
Naso-mental length	121	117	(?)	113	(?)	(?)	(?)	(?)	(?)	(?)
Ophryo-alveolar length	102	94(?)	88(?)	82(?)	(?)	(?)	(?)	83(?)	105(?)	90(
Naso-alveolar length	73	71	60	63	(?)	(?)	(?)	60(?)	73	59(
Basi-alveolar length	(?)	111	96	107	(?)	(?)	(?)	95(?)	106	99(
Basi-nasal length	(?)	103	93	101	(?)	101	(?)	99	106	93
Basi-bregmatic length	(?)	131	123	132	136(?)	126	(?)	135	139	123
Basion to obelion, length..	(?)	122	118	124(?)	(?)	117	(?)	128	127	119
Basion to lambda, length..	(?)	112	109	113	(?)	113	(?)	116	113	110
Basi-iniac length	(?)	75	73	70	(?)	83	(?)	80	87	81
Basion to opisthion, length	(?)	34	34	34	(?)	35	(?)	38	34	35
Breadth of foramen magnum	(?)	31	32	31	(?)	29	(?)	33	31	31
Orbital height	35	33	31	32	(?)	(?)	(?)	(?)	33	32
Orbital breadth	45	42	36	41	(?)	(?)	(?)	(?)	39	38
Nasal height	50	50	47	49	(?)	(?)	(?)	46	49	43
Nasal breadth	32	26	25	26	(?)	(?)	(?)	25	25	28
Palato-maxillary length	68	65	54	63	(?)	(?)	(?)	58(?)	62	(?
Palato-maxillary breadth	70	70	61	63	(?)	(?)	(?)	57(?)	71	(?
Arcs: Frontal	146	125	116	134	128	129	128	120	129	12
Parietal	128	121	118	128	145	129	128	124	131	12
Occipital: to inion	65	60	70	84	63	72	73	65	58	6
Occipital: In. to opisthion ..	35	45	44	37	45	51	(?)	46	56	4
Supra-auricular	300	291	280	307	(?)	284	295	(?)	296	30
Oblique parietal	345	331	333	356	(?)	326	350	(?)	342	35
Jugo-nasal	129	112	(?)	108	(?)	(?)	(?)	(?)	112	11
Horizontal circumference..	539	492 (507)	489	530	503	522	524	494	524	51
Anterior palatine breadth	27(?)	33	28	30	(?)	(?)	(?)	28	32	2
Posterior palatine breadth	38(?)	46	37	37	(?)	(?)	(?)	34	49	4
Minimum interorbital breadth	30	25	24	24	25	(?)	(?)	24	28	2
Occipito-spinal length	210	198	185	196	(?)	(?)	(?)	188	194	19
Occipito-alveolar length	220 (?)	210	194	203	(?)	(?)	(?)	188(?)	201	20

TABLE I.—PRINCIPAL MEASUREMENTS.

Males.

	2114	2115	2117	2118	2119	2122	2123	2125	2126	2127	2128	2129	2131	2133	2134
	Aged.	Adult.	Adult.	Adult.	Aged.	Adult.	Aged.	Aged.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.
	1275	1190	1300	1225	1183	1348	1230	1508	1025	1020	1135(?)	1300(?)	1535	1555(?)	1360
	185	193	187	193	183	188	187	195	175	183	188	193	190	183	184
	173	182	181	186	173	185	181	182	168	179	174	188	185	183	170
	178	187	183	184	177	185	186	190	173	178	181	190	186	183	183
	139	130	129	131	127	135	134	139	118	124	126	128	142	139	141
	108	109	106	109	99(?)	110	118	116	97	104	107	111	114	108	110
?)	103	105	103	95	98	107	115	112	94	99	94	101	108	109	113
	117	112	119	119	113	118	112	118	106	109	111	117	121	122	116
	95	97	93	90	91	103	98	91	89	93	91	99	97	97	103
	109	107	103	105	108	112	109	104	102	106	104	112	110	108	110
	133(?)	127	133(?)	136	131(?)	133	135	128(?)	124	123	132	(?)	137	145	134
	116	114	115	120	119	122	119	120	113	109	115	(?)	122	123	114
	87	90	87	97	95	94	93	96	90	82	94	(?)	103	98	94
	99	100	98	101	102	104	102	100	97	102	99	(?)	103	102	103
	(?)	115	(?)	(?)	88(?)	(?)	(?)	(?)	(?)	(?)	111	(?)	121	116	112
(?)	90(?)	97	98	97	93(?)	96	90	100(?)	90(?)	99	96	(?)	103	100	93
	59(?)	69	70	64	67(?)	66	66	65	62	72	67	(?)	73	75	65
	99(?)	112	104	101	110(?)	98	95	100	96	106	103	(?)	110	(?)	98
	93	103	100	101	104	102	100	100	97	99	103	105	110	(?)	99
	123	122	138	125	128	132	129	132	133	123	125	132	137	(?)	130
	119	118	134	119	118	125	120	130	128	121	127	130(?)	134	(?)	128
	110	115	122	109	119	112	111	122	113	112	119	116	122	(?)	115
	81	84	88	87	78	90	79	85	71	88	77	89	85	(?)	73
	35	31	37	35	40	34	34	36	30	34	34	41	36	(?)	37
	31	25	29	29	30	29	25	29	25	31	26	32	30	(?)	33
	32	33	33	35	32	31	34	31	31	32	32	(?)	33	36	38
	38	39	39	41	43	44	42	40	39	40	40	(?)	42	40	41
	43	49	49	48	51	51	51	46	43	49	50	(?)	57	54	50
	28	25	25	30	32	28	29	27	25	26	25	(?)	27	27	27
	(?)	65	60	56	(?)	53	53	57	55	64	59	(?)	59	55	56
	(?)	66	65	63	(?)	68	67	63	63	59	64	(?)	67	64	63
	127	126	128	134	119	134	130	124	119	115	115	132	131	132	117
	126	120	134	131	122	122	130	145	125	132	128	135	124	128	130
	62	65	61	55	65	55	67	71	72	55	72	57	68	79	78
	47	57	54	57	43	61	47	52	42	57	44	54	59	(?)	39
	300	283	295	280	292	310	304	309	282	279	288	295	315	318	292
	355	344	356	345	340	346	344	357	323	338	341	343	380	365	346
	110	111	108	111	114	116	113	114	109	110	108	(?)	114	116	113
	511	512	507	517	500	523	519	535	475	498	506	525	532	515	520
	29	29	31	27	34	30	29	28	29	28	27	(?)	31	30	27
	40	39	39	40	42	45	45	43	42	35	41	(?)	47	42	43
	24	24	22	25	27	28	25	25	26	24	25	26	27	26	25
	192	205	197	188	195(?)	194	190	202	182	193	201	(?)	210	179	193
	201(?)	219	209	192	207(?)	197	193	212(?)	191	205	210	(?)	216	182	200

TABLE I.—PRINCIPAL MEASUREMENTS.

Males.

2119	*2122*	*2123*	*2125*	*2126*	*2127*	*2128*	*2129*	*2131*	*2133*	*2134*	*2136*	*2137*	*2*
Aged.	Adult.	Aged.	Aged.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.	Adult.	Ad
1183	1348	1230	1508	1025	1020	1135(?)	1300(?)	1535	1555(?)	1360	(?)	1165	12
183	188	187	195	175	183	188	193	190	183	184	195	180	1
173	185	181	182	168	179	174	188	185	183	170	178	177	1
177	185	186	190	173	178	181	190	186	183	183	189	176	1
127	135	134	139	118	124	126	128	142	139	141	139	125	1
99(?)	110	118	116	97	104	107	111	114	108	110	105(?)	98	1
98	107	115	112	94	99	94	101	108	109	113	104	95	
113	118	112	118	106	109	111	117	121	122	116	114(?)	106	1
91	103	98	91	89	93	91	99	97	97	103	99	80	
108	112	109	104	102	106	104	112	110	108	110	110	103	1
131(?)	133	135	128(?)	124	123	132	(?)	137	145	134	130(?)	124	1
119	122	119	120	113	109	115	(?)	122	123	114	121	110	1
95	94	93	96	90	82	94	(?)	103	98	94	97	93	
102	104	102	100	97	102	99	(?)	103	102	103	107	94	1
88(?)	(?)	(?)	(?)	(?)	(?)	111	(?)	121	116	112	(?)	108	1
93(?)	96	90	100(?)	90(?)	99	96	(?)	103	100	93	105	105	1
67(?)	66	66	65	62	72	67	(?)	73	75	65	70	69	
110(?)	98	95	100	96	106	103	(?)	110	(?)	98	99	105	1
104	102	100	100	97	99	103	105	110	(?)	99	100	101	1
128	132	129	132	133	123	125	132	137	(?)	130	134	132	1
118	125	120	130	128	121	127	130(?)	134	(?)	128	130	128	1
119	112	111	122	113	112	119	116	122	(?)	115	120	112	1
78	90	79	85	71	88	77	89	85	(?)	73	77	74	
40	34	34	36	30	34	34	41	36	(?)	37	34	33	
30	29	25	29	25	31	26	32	30	(?)	33	27	28	
32	31	34	31	31	32	32	(?)	33	36	38	35	29	
43	44	42	40	39	40	40	(?)	42	40	41	43	38	
51	51	51	46	43	49	50	(?)	57	54	50	52	47	
32	28	29	27	25	26	25	(?)	27	27	27	30	27	
(?)	53	53	57	55	64	59	(?)	59	55	56	57	59	
(?)	68	67	63	63	59	64	(?)	67	64	63	66	59	
119	134	130	124	119	115	115	132	131	132	117	136	130	1
122	122	130	145	125	132	128	135	124	128	130	131	122	1
65	55	67	71	72	55	72	57	68	79	78	75	68	
43	61	47	52	42	57	44	54	59	(?)	39	45	43	
292	310	304	309	282	279	288	295	315	318	292	308(?)	291	2
340	346	344	357	323	338	341	343	380	365	346	362(?)	346	3
114	116	113	114	109	110	108	(?)	114	116	113	118	104	1
500	523	519	535	475	498	506	525	532	515	520	530	488	5
34	30	29	28	29	28	27	(?)	31	30	27	29	30	
42	45	45	43	42	35	41	(?)	47	42	43	45	36	
27	28	25	25	26	24	25	26	27	26	25	24	23	
195(?)	194	190	202	182	193	201	(?)	210	179	193	198	192	1
207(?)	197	193	212(?)	191	205	210	(?)	216	182	200	208	199	1

				Females and Youths.								
37	*2138*	*2139*	*2140*	*2135*	*2103*	*2110*	*2120*	*2121*	*2124*	*2130*	*2132*	*2111*
ult.	Adult.	Adult.	Adult.	Youth.	Adult.	Adult.	Adult.	Adult.	Age 12.	7 or 8.	Adult.	Young Adult.
5	1253	1445	1393	1160	(?)	1138	(?)	1075(?)	1243	1240	1210	1165
0	190	192	194	174	177	180	175	177	173	176	176	183
7	183	186	187	169	(?)	175	170	174	171	167	174	179
6	182	190	190	174	(?)	178	175	175	173	176	176	180
5	133	140	137	130	126	127	124	128	127	123	134	129
8	111	110	114	105	101	107	104	101	108	105	106	103
5	89	118	101	109	103(?)	100	107	97	104	105	107	93(?)
6	117	116	122	106	110	112	102(?)	106	100	102	110	108
0	87	104	97	97	91	95	90(?)	88	91	92	99	96
3	106	110	115	103	105	105	(?)	103	96	95	109	106
4	130	138(?)	141	117	(?)	123	(?)	123	108	110	125	123(?)
0	114	120	126	105	(?)	110	(?)	108	95	98	118	114
3	93	95	97	82	(?)	90	(?)	90	78	76	101	95
4	100	103	107	98	(?)	103	(?)	95	86	90	103	100
8	109	112	115	(?)	(?)	110	(?)	(?)	95	90	107	(?)
5	100	94	98	82	(?)	89	(?)	89	76	82	97(?)	92
9	63	68	68	55	(?)	65	(?)	68	55	56	65(?)	63
5	101	105	109	91	(?)	103	(?)	96	82	85	92	95
1	103	104	109	95	(?)	99	96	92	84	91	94	94
2	136	132	134	134	124(?)	127	115	115	118	122	126	118
8	129	124	131	128	(?)	122	111	115	120	123	123	117
2	118	112	120	111	(?)	109	100	110	109	120	110	107
4	82	76	86	77	(?)	82	72	89	86	75	81	84
3	37	37	38	31	(?)	33	29	33	35	33	33	34
8	32	30	30	27	(?)	28	27	26	25	28	29	28
9	33	36	33	32	(?)	37	(?)	35	31	34	31	37
8	43	41	42	41	(?)	41	(?)	37	37	37	40	39
7	45	49	52	45	(?)	45	(?)	49(?)	41	39	47(?)	45
7	26	30	27	27	(?)	25	(?)	25	23	21	28	28
9	60	59	67	52	(?)	57	(?)	54	45	45	57	55
9	66	65	65	61	(?)	63	(?)	63	56	55	63	62
0	128	133	125	127	115(?)	126	118	114	124	118	132	130
2	124	138	130	127	117(?)	124	128	114	131	124	120	127
8	72	71	66	57	55(?)	53	59	54	46	67	59	54
3	48	40	51	49	(?)	51	46	60	55	44	53	54
1	293	310	292	305	272(?)	278	284(?)	272	287	278	303	277
6	347	355	350	339	321(?)	344	330(?)	344	340	326	346	342
4	114	115	120	111	(?)	114	(?)	106	95	105	112	112
8	512	540	528	486	490	495	481	490	483	485	500	505
0	29	33	29	31	(?)	28	(?)	29	26	32	27	27
6	41	43	39	39	(?)	38	(?)	41	31	34	39	38
3	25	28	29	24	(?)	27	(?)	24	21	23	27	28
2	193	200	209	183	(?)	191	(?)	190	179	177	178	185
9	199	207	215	189	(?)	200	(?)	200	183	182	190	193

Number of skull	*2101*	*2102*	*2104*	*2105*	*2106*	*2107*	*2108*	*2112*
Index, Cephalic	64·9	70·2	73·1	70·7	71	68·4	73·3	65·9
„ Vertical	(?)	72·4	70·3	69·1	73·1 (?)	65·3	(?)	74·2
Alveolar	(?)	107·8	103·2	105·9	(?)	(?)	(?)	(?)
Orbital	77·8	78·6	86·1	78	(?)	(?)	(?)	(?)
Nasal	64	52	53·2	53·1	(?)	(?)	(?)	54·3
Palato-maxillary	102·9	107·7	113	100	(?)	(?)	(?)	(?)
Facial (total)	87·5	(?)	(?)	95·7 (?)	(?)	(?)	(?)	(?)
Facial, superior (Broca) ..	72·85	(?)	(?)	(?)	(?)	(?)	(?)	(?)
Facial, superior (Kollmann)..	52	(?)	47·6 (?)	47·7 (?)	(?)	(?)	(?)	(?)
Stephano-zygomatic	70·7	(?)	76·2 (?)	82·6 (?)	(?)	(?)	(?)	(?)
Gonio-zygomatic	72·1	(?)	(?)	82·6 (?)	(?)	(?)	(?)	(?)
Naso-malar (Oldfield Thomas)	110·25	113·1	(?)	111·3	(?)	(?)	(?)	(?)
Dental (Flower)	(?)	(?)	(?)	47·5	(?)	(?)	(?)	(?)

	Males.							
Number of skull	*2128*	*2129*	*2131*	*2133*	*2134*	*2136*	*2137*	*2138*
Index, Cephalic	67	66·3	74·7	76	76·6	71·3	69·4	70
„ Vertical	66·5	68·4	72·1	(?)	70·7	68·7	73·3	71·6
Alveolar	100	(?)	100	(?)	99	99	104	98·1
Orbital	80	(?)	78·6	90	92·7	81·4	76·3	76·7
Nasal	50	(?)	47·4	50	54	57·7	57·4	57·8
Palato-maxillary	108·5	(?)	120·3	116·4	112·5	115·8	100	110
Facial (total)	97·8	(?)	94·5	105·5	99·3	(?)	89·2	94·2
Facial, superior (Broca) ..	72·7	(?)	75·2	69·65	69·4	80·75(?)	84·7	76·9
Facial, superior (Kollmann)..	50·75	(?)	53·3	51·7	48·5	53·8 (?)	55·6	48·5
Stephano-zygomatic	71·2	(?)	78·8	75·2	84·3	80 (?)	76·6	68·5
Gonio-zygomatic	70·45	(?)	72·3	77·9	71·6	(?)	75	71
Naso-malar (Oldfield Thomas)	109·1	(?)	110·7	113·7	109·7	110·3	110·6	114
Dental (Flower)	45·6	(?)	33·6	(?)	44·5	(?)	42·7	44·7

Males.

2112	2113	2114	2115	2117	2118	2119	2122	2123	2125	2126	2127
65·9	68·8	75·1	67·4	69	67·9	69·4	71·8	71·7	71·3	67·4	67·8
74·2	73·5	66·5	63·2	73·8	64·8	69·9	70·2	69	67·7	76	67·2
(?)	100	106·5	108·7	104	100	105·8	96·1	95	100	99	107·1
(?)	84·6	84·2	84·6	84·6	85·4	74·4	70·5	81	77·5	79·5	80
54·3	51	65·1	51	51	62·5	62·7	54·9	56·9	58·7	58·1	53·1
(?)	114·5	(?)	101·5	108·4	112·5	(?)	128·3	126·4	112·3	114·5	92·2
(?)	(?)	(?)	92	(?)	(?)	(?)	96·4	(?)	(?)	(?)	(?)
(?)	79·5 (?)	(?)	76·4	73·7 (?)	71·3	(?)	72·2	66·7	(?)	72·6 (?)	80·5
(?)	55·3	(?)	54·3	52·6	47·1	(?)	49·6	48·9	50·8	50 (?)	58·5
(?)	72 (?)	(?)	82·7	77·4 (?)	69·9	74·8	82	85·2	87·5 (?)	75·8	80·5
(?)	(?)	(?)	65·35	(?)	(?)	74	71·4	(?)	(?)	(?)	(?)
(?)	110·9	111·1	111	110·2	109·9	111·8	111·5	110·8	114	112·4	107·8
(?)	(?)	(?)	49·5	46	41·6	(?)	(?)	(?)	(?)	(?)	43·4 (?)

			Females.					Youths.			
2138	2139	2140	2103	2110	2120	2121	2132	2111	2124	2130	2135
70	72·9	70·6	71·2	70·6	70·9	72·3	76·1	70·5	73·4	69·9	74·7
71·6	68·8	69·1	70·1	70·6	65·7	65	71·6	64·5	68·2	69·3	77
98·1	101	100	(?)	104	(?)	104·3	97·9	101·1	97·6	93·4	95·8
76·7	87·8	78·6	(?)	90·2	(?)	94·6	77·5	94·9	83·8	91·9	78
57·8	61·2	51·9	(?)	55·5	(?)	51	59·6 (?)	62·2	56·1	53·8	60
10	110·1	97	(?)	110·5	(?)	116·7	110·5	112·7	124·5	122·3	117·3
94·2	99·3 (?)	105·2	(?)	91·8	(?)	(?)	95·4	(?)	90	96·5	(?)
76·9	68·1 (?)	69·5	(?)	72·35	(?)	72·35	77·6	(?)	70·4	74·5	70·1
48·5	49·3 (?)	48·2	(?)	52·8	(?)	55·3	52 (?)	51·2	50·9	50·9	47
88·5	85·5 (?)	71·6	(?)	81·3	(?)	78·9	85·6	(?)	96·3	95·45	93·2
71	69·6 (?)	74·5	(?)	79·7	(?)	(?)	68·8	(?)	73·1	76·4	(?)
14	111·7	112·15	(?)	110·7	(?)	111·6	108·7	112	110·5	116·7	113·3
44·7	49·3 (?)	45·9	(?)	(?)	(?)	50	48·9	46·8	(?)	(?)	44·3

TABLE III.

Averages.	All the skulls.			
	29 *adults*, 5 *aged*, 4 *youths*.			
		No.	Range.	
Cubic capacity	1252·1	26	1020	1535
Maximum length	185·1	38	173	202
Ophryo-iniac length	178	37	166	195
Ophryo-occipital length	182	37	173	194
Maximum breadth	131	38	118	142
Bi-asterial breadth	108	34	97	119
Bi-stephanic breadth	103	34	89	118
Bi-auricular breadth	113	34	106	122
Minimum frontal breadth	94	37	79	104
External bi-orbital breadth	107	37	95	120
Bi-zygomatic breadth	128·5	21	108	145
Bi-malar breadth	115·5	30	95	128
Bi-maxillary breadth	92	31	76	103
Jugo-nasal breadth	100	30	86	117
Naso-mental length	111	16	90	121
Ophryo-alveolar length	95	22	76	105
Naso-alveolar length	66·5	28	55	75
Basi-alveolar length	100	27	82	112
Basi-nasal length	99	33	84	110
Basi-bregmatic length	128	33	115	139
Basion to obelion length	124	31	111	134
Basion to lambda length	114	33	100	122
Basi-iniac length	81	33	70	90
Basion to opisthion length	35	33	29	41
Breadth of foramen magnum	30	33	25	33
Orbital height	33	32	29	38
Orbital breadth	43	31	36	45
Nasal height	48	30	39	57
Nasal breadth	26	32	21	32
Palato-maxillary length	58	29	45	68
Palato-maxillary breadth	64	29	55	71
Arcs: Frontal	129	37	114	146
Parietal	128	37	114	145
Occipital superior	65	37	46	84
Occipital inferior	49	35	35	61
Supra-auricular	293	33	272	318
Oblique parietal	345	33	323	380
Jugo-nasal	112	30	95	129
Horizontal circumference	509	38	475	540
Anterior palatine breadth	29	31	27	34
Posterior palatine breadth	40	31	31	49
Minimum inter-orbital breadth ..	25	34	21	30
Occipito-spinal length	193	31	178	210
Occipito alveolar length	200	28	182	220

TABLE III.—*continued.*

Averages.	All the males.			
	24 *adults*, 5 *aged.*			
		No.	Range.	
Cubic capacity	1269·9	20	1020	1535
Maximum length	188	29	175	202
Ophryo-iniac length	183	29	166	195
Ophryo-occipital length	183	29	173	194
Maximum breadth	132	29	118	142
Bi-asterial breadth	109	25	97	119
Bi-stephanic breadth	102	28	89	118
Bi-auricular breadth	115	26	106	122
Minimum frontal breadth	98	29	79	104
External bi-orbital breadth	108	29	97	120
Bi-zygomatic breadth	133	15	123	145
Bi-malar breadth	119	23	109	128
Bi-maxillary breadth	94	24	82	103
Jugo-nasal breadth	102	23	94	117
Naso-mental length	114	12	108	121
Ophryo-alveolar length	98	16	90	105
Naso-alveolar length	68	22	60	75
Basi-alveolar length	103	20	95	112
Basi-nasal length	101	25	93	110
Basi-bregmatic length	130·5	25	122	139
Basion to obelion length	125	23	117	134
Basion to lambda length	115	25	109	122
Basi-iniac length	81	25	70	90
Basion to opisthion length	35	25	30	41
Breadth of foramen magnum	30	25	25	33
Orbital height	33	25	29	38
Orbital breadth	41	24	36	45
Nasal height	49	25	43	57
Nasal breadth	27	25	25	32
Palato-maxillary length	59	22	53	68
Palato-maxillary breadth	65	22	59	71
Arcs: Frontal	130	29	115	146
Parietal	129	29	118	145
Occipital superior	67	29	55	84
Occipital inferior	48	27	35	61
Supra-auricular	307	25	279	310
Oblique parietal	345	26	323	380
Jugo-nasal	113	23	104	129
Horizontal circumference	514	29	475	540
Anterior palatine breadth	30	24	27	34
Posterior palatine breadth	41	24	35	49
Minimum inter-orbital breadth	25	27	22	30
Occipito-spinal length	195	24	179	210
Occipito-alveolar length	203	21	182	220

TABLE III.—*continued.*

Averages.	Males, without 4 doubtful ones.			
	21 *adults*, 4 *aged*.			
		No.	Range.	
Cubic capacity	1235	17	1020	1445
Maximum length	188	25	175	202
Ophryo-iniac length	183	25	166	195
Ophryo-occipital length	183	25	173	194
Maximum breadth	131	25	118	140
Bi-asterial breadth	109	21	97	119
Bi-stephanic breadth	101	24	89	118
Bi-auricular breadth	114	22	106	122
Minimum frontal breadth	98	25	79	104
External bi-orbital breadth	108	25	97	120
Bi-zygomatic breadth	131	12	123	141
Bi-malar breadth	118	19	109	128
Bi-maxillary breadth	93	20	82	103
Jugo-nasal breadth	101·5	19	94	117
Naso-mental length	113	9	108	121
Ophryo-alveolar length	98	13	90	105
Naso-alveolar length	67	18	60	73
Basi-alveolar length	103	17	95	112
Basi-nasal length	101	22	93	109
Basi-bregmatic length	130	22	122	139
Basion to obelion length	124	20	117	134
Basion to lambda length	114	22	109	122
Basi-iniac length	82	22	70	90
Basion to opisthion length	35	22	30	41
Breadth of foramen magnum	29	22	25	33
Orbital height	33	21	29	36
Orbital breadth	41	20	36	45
Nasal height	50	21	43	52
Nasal breadth	27	21	25	32
Palato-maxillary length	65·5	18	53	68
Palato-maxillary breadth	65	18	59	71
Arcs: Frontal	131	25	115	146
Parietal	128	25	118	145
Occipital superior	66	25	55	84
Occipital inferior	48	24	35	61
Supra-auricular	307	21	279	310
Oblique parietal	343	22	323	356
Jugo-nasal	113	19	104	129
Horizontal circumference	513	25	475	540
Anterior palatine breadth	30	20	27	34
Posterior palatine breadth	41	20	35	49
Minimum inter-orbital breadth ..	25	23	22	30
Occipito-spinal length	195	20	179	210
Occipito-alveolar length	204	18	191	220

TABLE III.—*continued.*

Averages.	All the females but one. 5 *adults.*			
		No.	Range.	
Cubic capacity	1174	2	1138	1210
Maximum length	177	5	175	180
Ophryo-iniac length	173	4	170	175
Ophryo-occipital length	176	4	175	178
Maximum breadth	128	5	124	134
Bi-asterial breadth	104	5	101	107
Bi-stephanic breadth	103	4	97	107
Bi-auricular breadth	109·5	4	106	112
Minimum frontal breadth	94	4	88	99
External bi-orbital breadth	105·5	4	103	106
Bi-zygomatic breadth	121	3	123	125
Bi-malar breadth	115	3	108	118
Bi-maxillary breadth	94	3	90	101
Jugo-nasal breadth	100	3	95	103
Naso-mental length	108·5	2	107	110
Ophryo-alveolar length	89	2	89	89
Naso-alveolar length	67·5	2	65	68
Basi-alveolar length	97	3	92	103
Basi-nasal length	95	4	92	99
Basi-bregmatic length	121	4	115	127
Basion to obelion length	118	4	111	123
Basion to lambda length	107	4	100	110
Basi-iniac length	81	4	72	89
Basion to opisthion length	32	4	29	33
Breadth of foramen magnum	27·5	4	26	29
Orbital height	34	3	31	37
Orbital breadth	39	3	37	41
Nasal height	45	1	45	45
Nasal breadth	26	3	25	28
Palato-maxillary length	56	3	54	57
Palato-maxillary breadth	63	3	63	63
Arcs: Frontal	122·5	4	114	132
Parietal	121·5	4	114	128
Occipital superior	56	4	53	59
Occipital inferior	52·5	4	46	60
Supra-auricular	284	3	272	303
Oblique parietal	344·5	3	344	346
Jugo-nasal	111	3	106	114
Horizontal circumference	491	5	481	500
Anterior palatine breadth	28	3	27	29
Posterior palatine breadth	39	3	38	41
Minimum inter-orbital breadth ..	26	3	24	27
Occipito-spinal length	186	3	178	191
Occipito-alveolar length	197	3	190	200

TABLE IV.

Averages of the Indices.	All the skulls.				All the males.			
	29 adults, 5 aged, 4 youths.				*24 adults, 5 aged.*			
Index.		No.	Range.			No.	Range.	
Cephalic	70·5	38	64·9	76·6	70	29	64·9	76·6
Vertical	69·6	35	63·2	77	69·8	26	63·2	76
Alveolar	101·2	29	93·4	108·7	101·8	22	95	108·7
Orbital	82·6	31	70·5	94·9	81·2	24	70·5	92·7
Nasal	55·6	32	47·4	65·1	55·4	26	47·4	65·1
Palato-maxillary	111·7	29	92·2	128·3	110·4	22	92·2	128·3
Facial, total	95·4	14	87·5	105·5	96·2	10	87·5	105·5
Facial, superior (Broca)	73·4	19	66·7	84·7	73·7	13	66·7	84·7
Facial, superior (Kollmann)	51·7	21	47	58·5	51·8	15	47·1	58·5
Stephano-zygomatic	79·9	21	68·5	96 3	76·5	15	68·5	85·2
Gonio-zygomatic	72·9	15	65·35	79 ,	72·3	11	65·35	77·9
Naso-malar	111·4	30	107·8	116·7	111·2	23	107·8	114
Dental (Flower)	45·2	13	33·6	50	44·2	10	33·6	49·5

TABLE IV.—*continued.*

Averages of the Indices.	Males without the 4 doubtful ones.				Adult Females (5).			
	21 *adults*, 4 *aged*.							
Index.		No.	Range.			No.	Range.	
Cephalic	69·2	25	64·9	75·1	72·9	5	70·6	76·1
Vertical	69·3	23	63·2	76	68·6	5	65	71·6
Alveolar	102·15	19	95	108·7	102·7	3	97·9	104·3
Orbital	80·5	20	70·5	87·9	87·4	3	77·5	94·6
Nasal	55·9	22	51	65·1	53·25	2	51	55·5
Palato-maxillary	109·6	18	92·2	128·3	112·6	3	110·5	116·7
Facial, total	94·6	7	87·5	105·2	93·6	2	91·8	95·4
Facial, superior (Broca)	73·4	10	66·7	84·7	74·1	3	72·35	77·6
Facial, superior (Kollman)	52·1	11	47·1	58·5	54	2	52·8	55·3
Stephano-zygomatic	75·8	12	68·5	85·2	81·9	3	78·9	85·6
Gonio-zygomatic	71·7	8	65·35	77·9	74·25	2	68·8	79·7
Naso-malar..	111	19	107·8	114	110·4	3	108·7	111·6
Dental Flower)	45·8	8	41·6	49·5	49·45	2	48·9	50

TABLE V.—MEASUREMENTS ON THE LOWER JAW.

	Males.														A	Females.				B	C	D
Number of Skull	*2101*	*2109*	*2105*	*2115*	*2119*	*2129*	*2128*	*2131*	*2133*	*2134*	*2137*	*2138*	*2139*	*2140*	Average	*2110*	*2124*	*2130*	*2132*	Average	Average	Average
Height at symphysis ...	43	32	33	33	22	30	29	33	31	29	29	29	31	32	32	35	26	23	32	33·5	32	31·3
Coronoid height	70	45	67	50	61	58	57	68	73	68	59	65	54	65	61	63	44	46	55	59	59	58·9
Condylar height	63	48	64	49	54	49	52	65	73	63	58	61	54	61	58	61	44	41	52	56·5	56	56
Gonio-symphysial length ...	87	95	82	80	79	78	77	90	83	78	80	77	76	84	82	81	65	61	80	80·5	82	79·6
Intergonial breadth ...	101	102	109	83	97	95	93	99	113	96	93	91	96	105	98	98	79	84	86	92	97	95·35
Intercoronoid breadth ...	105	103	101	87	92	103	92	101	105	101	87	95	100	97	98	95	?	83	94	94·5	97	96·6
Intercondylar breadth, external	123	123	120	115	116	116	114	113	130	117	108	108	118	126	118	115	90	98	111	113	117	114·6
Intercondylar breadth, internal	81	92	78	79	?	78	79	71	85	79	68	69	80	82	78·5	78	62	74	72	75	79	77·1
Breadth of ascending ramus	39	39	36	38	33	32	34	43	38	40	41	35	37	40	38	36	32	31	36	36	38	37
Angle of ascending ramus	128°	123°	113°	133°	126°	132°	124°	127°	116°	114°	110°	107°	126°	102°	120°	112°	118°	127°	119°	115°·5	120°	120°
Basi-mental length ...	?	112	117	118	122	108	110	124	123(?)	106	106	111	117	115	113	116	90	90	103	109·5	113	109·5
Ophryo-mental length ...	160	138	138	138	112(?)	138	135	145	140	135	139	138	139	134	140	134	120	114	131	132·5	140	136·4

Average of all males without No. 2119: A.
Average of 2 adult females: B.
Average of males without Nos. 2119, 2131, 2133, 2134: C.
Average of all of both sexes: D.

TABLE VI.—ADDITIONAL MEASUREMENTS.

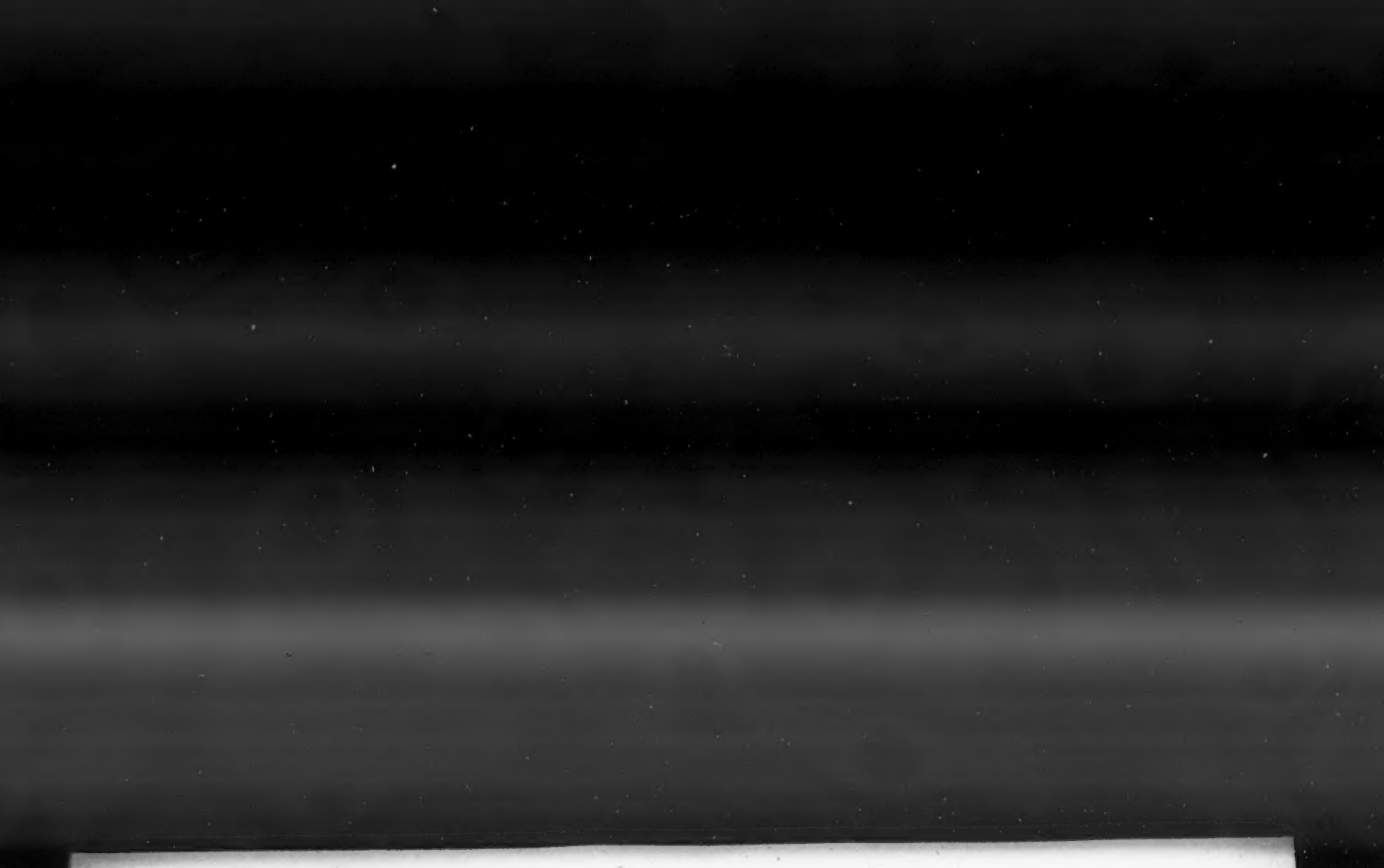
Skull.	Weight with jaw.	Weight without jaw.	Length of Parieto-sphenoid suture.		Length of Lacrymo-ethmoid suture.		Choanae or Posterior nares.		Length of floor of nasal cavity.	Least distance between the temporal crests.
			Right.	Left.	Right.	Left.	Height.	Breadth.		
2101	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	66
2102	749	656	10	11	8	8	23	26	57	97
2104	—	669	10	6	9	(?)	22	27	50	93
2105	985	853	10	12	10	9	22	26	59	100
2106	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	100 (?)
2107	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	97 (?)
2108	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	111 (?)
2112	(?)	(?)	1	(?)	(?)	(?)	(?)	(?)	54 (?)	56
2113	(?)	629	—	—	9	9	23	30	56	71
2114	(?)	577	—	2	(?)	(?)	(?)	(?)	(?)	90
2115	893	784	(?)	(?)	7	5	22	27	58	108
2117	(?)	752	6	3	9	6	24	29	54	90
2118	(?)	669	3	11	9	9	28	29	54	75
2119	634	583	—	11	(?)	(?)	25	25	55 (?)	95
2122	639	559	—	—	—	3	24	28	52	95
2123	(?)	580	—	—	10	11	30	29	50	104
2125	(?)	533	13	14	(?)	11	27	32	53	104
2126	(?)	606	5	(?)	7	7	24	27 (?)	46	77
2127	(?)	686	11	(?)	(?)	(?)	27	27	46	89
2128	669	574	(?)	10	(?)	(?)	26	23	55	82
2129	(?)	(?)	3	3	(?)	(?)	(?)	(?)	(?)	94
2131	897	771	15	17	10	(?)	25	26	60	88
2133	800	677	10	12	(?)	14 (?)	(?)	(?)	50	96

TABLE VI.—ADDITIONAL MEASUREMENTS—*continued.*

Skull.	Weight with jaw.	Weight without jaw.	Length of Parieto-sphenoid suture.		Length of Lacrymo-ethmoid suture.		Choanae or Posterior rares.		Length of floor of nasal cavity.	Least distance between the temporal crests.
			Right.	Left.	Right.	Left.	Height.	Breadth.		
2134	634	534	3	3	11	9	26	29	50	116
2136	(?)	(?)	13	5	(?)	(?)	(?)	(?)	(?)	113
2137	917	809	—	—	6	8	23	27	58	73
2138	830	722	2	—	7	6	26	27	54	65
2139	796	707	14	14	9	6	28	26	59	104
2140	816	711	7	8	6	10	22	29	61	77
2103	(?)	(?)	8	8	(?)	(?)	(?)	(?)	(?)	103 (?)
2110	811	705	—	—	7	7	22	27	54	95 (?)
2120	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	104
2121	(?)	532	—	9	2	·5 (?)	26	25	46	95
2132	719	623	5 + w	16	6	7	23	24	48 (?)	119
2124	372	327	—	—	7	7	21	24	45	99
2130	(?)	404	14	12	6 (?)	6 (?)	19	29 (?)	44	116
2135	(?)	588	3	8	10	10	20	27	48	113
2111	(?)	586	3	—	(?)	(?)	23	23	49	91 (?)
Average of all..	753·8 (16)	(29) 634·7	7·7 (22)	9·3 (21)	7·9 (20)	7·8 (19)	24·1 (27)	26·9 (25)	52·6 (26)	92·9 32)
Average of males	781·5 (13)	(22) 665·5	8 (17)	8·9 (16)	8·5 (15)	7·8 (15)	25·8 (20)	27·5 (19)	54·1 (20)	89·6 (26)
Average of males without four doubtful cases	782·8 (10)	(18) 673·6	7·3 (13)	8 (12)	8·1 (13)	7·5 (13)	25·8 (17)	27·2 (16)	54·3 (16)	87·5 (22)
Average of females (adults)	765 (2)	(3) 620	6·5 (2)	11 (3)	5 (3)	7 (2)	23·7 (3)	28 (3)	50 (2)	106 (3)

TABLE VII.—DIMENSIONS OF TEETH.

Number of Skull.	Combined lengths of three molar teeth.				Combined lengths of molars and premolars.			
	Upper.		Lower.		Upper.		Lower.	
Males.	Right.	Left.	Right.	Left.	Right.	Left.	Right.	Left.
2101	34	34	39	38	49	49	54	53
2102	32	32	(?)	(?)	46	46	(?)	(?)
2105	31	32	34	35	48	45	50	49
2115	33	32	35	36	51	—	—	—
2117	(?)	32	(?)	(?)	(?)	46	(?)	(?)
2118	29	29	(?)	(?)	42	42	(?)	(?)
2127	(?)	(?)	(?)	(?)	43(?)	(?)	(?)	(?)
2128	31	32	35	33	47	(?)	(?)	(?)
2131	(?)	(?)	(?)	(?)	(?)	(?)	37	(?)
2133	(?)	(?)	(?)	(?)	46(?)	(?)	(?)	(?)
2134	30	(?)	(?)	(?)	44	(?)	(?)	(?)
2137	29	30	31	32	43	44	46	46
2138	32	35	37	37	46	47	52	51
2139	(?)	(?)	35	(?)	44	44	49	49
2140	39	37	40	(?)	50	50	57	(?)
Females.								
2110	(?)	(?)	(?)	32	(?)	(?)	(?)	35
2121	32	31	(?)	(?)	46	46	(?)	(?)
2132	29	30	33	(?)	(?)	(?)	46	(?)
Youths.								
2111	30	31	(?)	(?)	44	43	(?)	(?)
2135	29(?)	(?)	(?)	(?)	42(?)	(?)	(?)	(?)
Average of males.	32 (10)	32·5 (10)	36 (8)	35 (6)	46 (11)	46 (9)	49 (7)	50 (5)
Average of females.	30·5 (2)	30·5 (2)	33 (1)	32 (1)	46 (1)	46 (1)	46 (1)	(?)



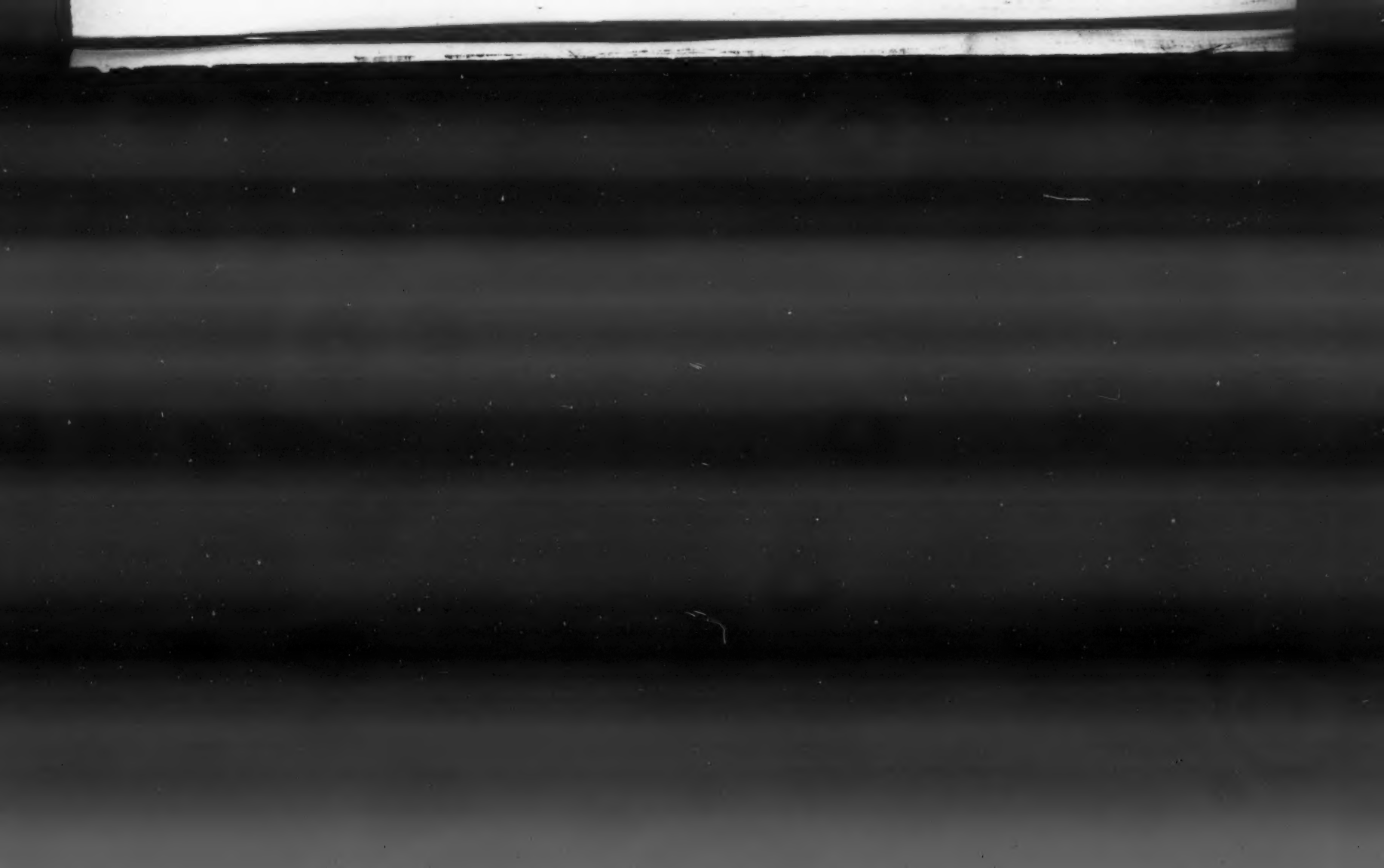
	Males.								
Number of Skull.	*2101*	*2102*	*2104*	*2105*	*2106*	*2107*	*2108*	*2112*	*2113*
Index: Cephalic	64·9	70·2	73·1	70·7	71	68·4	73·3	65·9	68·8
„ Vertical	(?)	72·4	70·3	69·1	73·1 (?)	65·3	(?)	74·2	73·5
„ Alveolar	(?)	107·8	103·2	105·9	(?)	(?)	(?)	(?)	100
„ Orbital	77·8	78·6	86·1	78	(?)	(?)	(?)	(?)	84·6
„ Nasal	64	52	53·2	53·1	(?)	(?)	(?)	54·3	51
„ Palato-maxillary	102·9	107·7	113	100	(?)	(?)	(?)	(?)	114·5
„ Facial (total)	87·5	(?)	(?)	95·7	(?)	(?)	(?)	(?)	(?)
„ Facial, superior (Broca).. ..	72·85	(?)	(?)	(?)	(?)	(?)	(?)	(?)	79·5
„ Facial, superior (Kollmann) ..	52	(?)	(?)	(?)	(?)	(?)	(?)	(?)	55·3
„ Stephano-zygomatic	70·7	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
„ Gonio-zygomatic	72·1	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
„ Naso-malar	110·25	113·1	(?)	111·3	(?)	(?)	(?)	(?)	110·9
„ Dental (Flower)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
Cubic capacity	(?)	1155	1080	1368	(?)	(?)	(?)	(?)	1340
Maximum length	202	181	175	191	186	193	187	182	189
Maximum breadth..	131	127	128	135	132	132	137	120	130
Basi-bregmatic height	(?)	131	123	132	136 (?)	126	(?)	135	139
Basil-alveolar length	(?)	111	96	107	(?)	(?)	(?)	(?)	106
Basi-nasal length	(?)	103	93	101	(?)	101	(?)	99	106
Orbital height	35	33	31	32	(?)	(?)	(?)	(?)	33
Orbital breadth	45	42	36	41	(?)	(?)	(?)	(?)	39
Nasal height	50	50	47	49	(?)	(?)	(?)	46	49
Nasal breadth	32	26	25	26	(?)	(?)	(?)	25	25

Table VIII.—Aborigines of South Australia.

								Females.			Youth.	Average of all.	No.
2113	*2114*	*2115*	*2117*	*2118*	*2122*	*2128*	*2131*	*2103*	*2110*	*2121*	*2111*	—	—
68·8	75·1	67·4	69	67·9	71·8	67	74·7	71·2	70·6	72·3	70·5	70·2	20
73·5	66·5	63·2	73·8	64·8	70·2	66·5	72·1	70·1	70·6	65	64·5	68·9	17
00	106·5	108·7	104	100	96·1	100	100	(?)	104	104·3	101·1	103	14
84·6	84·2	84·6	84·6	85·4	70·5	80	78·6	(?)	90·2	94·6	94·9	83·5	15
51	65·1	51	51	62·5	54·9	50	47·4	(?)	55·5	51	62·2	54·9	16
14·5	(?)	101·5	108·4	112·5	128·3	108·5	120·3	(?)	110·5	116·7	112·7	111·25	14
(?)	(?)	92	(?)	(?)	96·4	97·8	94·5	(?)	91·8	(?)	(?)	93·7	7
79·5	(?)	76·4	(?)	71·3	72·2	72·7	75·2	(?)	72·35	72·35	(?)	73·9	9
55·3	(?)	54·3	52·6	47·1	49·6	50·75	53·3	(?)	52·8	55·3	51·2	52·2	11
(?)	(?)	82·7	(?)	69·9	82	71·2	78·8	(?)	81·3	78·9	(?)	76·9	8
(?)	(?)	65·35	(?)	(?)	71·4	70·45	72·3	(?)	79·7	(?)	(?)	71·9	6
10·9	111·1	111	110·2	109·9	111·5	109·1	110·7	(?)	110·7	111·6	112	110·95	14
(?)	(?)	49·5	46	41·6	(?)	45·6	33·6	(?)	(?)	50	46·8	44·7	7
1340	1275	1190	1300	1225	1348	1135 (?)	1535	(?)	1138	1075 (?)	1165	1260	12
189	185	193	187	193	188	188	190	177	180	177	183	186·35	20
130	139	130	129	131	135	126	142	126	127	128	129	130·7	20
139	123	122	138	125	132	125	137	124 (?)	127	115	118	128	16
106	99 (?)	112	104	101	98	103	110	(?)	103	96	95	103·2	13
106	93	103	100	101	102	103	110	(?)	99	92	94	100	16
33	32	33	33	35	31	32	33	(?)	37	35	37	33·5	15
39	38	39	39	41	44	40	42	(?)	41	37	39	40·2	15
49	43	49	49	48	51	50	57	(?)	45	49	45	48·6	16
25	28	25	25	30	28	25	27	(?)	25	25	28	26·6	16

		Females.			Youth.	Average of all.	No.	Range.	Average of Males.	No.
2128	*2131*	*2103*	*2110*	*2121*	*2111*	—	—		—	—
67	74·7	71·2	70·6	72·3	70·5	70·2	20	64·9 — 75·1	69 95	16
66·5	72·1	70·1	70·6	65	64·5	68·9	17	63·2 — 74·2	69·4	13
100	100	(?)	104	104·3	101·1	103	14	96·1 — 108·7	103	11
80	78·6	(?)	90·2	94·6	94·9	83·5	15	70·59 —94·9	81·1	12
50	47·4	(?)	55·5	51	62·2	54·9	16	47·4 — 65·1	54·6	13
108·5	120·3	(?)	110·5	116·7	112·7	111·25	14	100 — 128·3	110·7	11
97·8	94·5	(?)	91·8	(?)	(?)	93·7	7	87·5 — 97·8	94	6
72·7	75·2	(?)	72·35	72·35	(?)	73·9	9	71·3 — 79·5	74·3	7
50·75	53·3	(?)	52·8	55·3	51·2	52·2	11	47·1 — 55·3	51·9	8
71·2	78·8	(?)	81·3	78·9	(?)	76·9	8	69·9 — 82·7	75·9	6
70·45	72·3	(?)	79·7	(?)	(?)	71·9	6	65·35 — 79·7	70·3	5
109·1	110·7	(?)	110·7	111·6	112	110·95	14	109·1 — 113·1	110·8	11
45·6	33·6	(?)	(?)	50	46·8	44·7	7	33·6 — 50	43·3	5
1135 (?)	1535	(?)	1138	1075 (?)	1165	1260	12	1080 — 1535	1282	10
188	190	177	180	177	183	186·35	20	175 — 202	188·1	16
126	142	126	127	128	129	130·7	20	120 — 142	131·5	16
125	137	124 (?)	127	115	118	128	16	115 — 139	129·9	13
103	110	(?)	103	96	95	103·2	13	95 112	104·8	10
103	110	(?)	99	92	94	100	16	92 110	101·15	13
32	33	(?)	37	35	37	33·5	15	31 37	32·75	12
40	42	(?)	41	37	39	40·2	15	36 45	40·5	12
50	57	(?)	45	49	45	48·6	16	43 57	49	13
25	27	(?)	25	25	28	26·6	16	25 32	26·7	13

No.	Range.	Av. of M. excluding No. 2131	No.	Range.	Average of Females.	No.	Range.
—		—	—		—	—	
16	64·9 — 75·1	69·6	15	64·9 — 75·1	71·4	3	70·6 — 72·3
13	63·2 — 74·2	69·15	12	63·2 — 74·2	65·2	3	65 — 70·6
11	96·1 — 108·7	103	10	96·1 — 108·7	104	2	104 — 104·3
12	70·5 — 86·1	81·5	11	70·5 — 86·1	92·4	2	90·2 — 94·6
13	47·4 — 65·1	55·2	12	50 — 65·1	53·25	2	51 — 55·5
11	100 — 128·3	109·7	10	100 — 128·3	113·6	2	110·5 — 116·7
6	87·5 — 97·8	93·9	5	87·5 — 97·8	91·8	1	91·8
7	71·3 — 79·5	74·15	6	71·3 — 79·5	72·35	2	72·35 — 72·35
8	47·1 — 55·3	51·7	7	47·1 — 55·3	54·05	2	52·8 — 55·3
6	69·9 — 82·7	73·3	5	69·9 — 82·7	80·1	2	81·3 — 78·9
5	65·35 — 72·3	69·8	4	65·35 — 72·1	79·7	1	79·7
11	109·1 — 113·1	110·8	10	109·1 — 113·1	111·15	2	110·7 — 111·6
5	33·6 — 49·5	45·7	4	41·6 — 49·5	50	1	50
10	1080 — 1535	1264·5	9	1080 — 1368	1138	1	1138
16	175 — 202	186·7	15	175 — 202	178	3	177 — 180
16	120 — 142	130·8	15	120 — 139	127	3	126 — 128
13	122 — 139	129·25	12	122 — 139	121	2	115 — 127
10	96 112	104·2	9	96 112	99·5	2	96 103
13	93 110	100·4	12	93 106	95·5	2	92 99
12	31 35	32·7	11	31 35	36	2	35 37
12	36 45	40·4	11	36 45	39	2	37 41
13	43 57	48·4	12	43 51	47	2	45 49
13	25 32	26·7	12	25 32	25	2	25 25



Part of Table IX.

Seriations of Basi-Bregmatic Height.

Adult well authenticated males from South Australia are considered only.

Cambridge University collection.		All available specimens.	
Modulus 2 units.		Modulus 2 units.	
120–122	1	120–122	1
122–124	2	122–124	3
124–126	3	124–126	5
126–128	0	126–128	1
128–130	0	128–130	1
130–132	3	130–132	5
132–134	0	132–134	3
134–136	1	134–136	1
136–138	1	136–138	2
138–140	1	138–140	1
		140–142	1
Modulus 5 units.		Modulus 5 units.	
115–120	—	120–125	8
120–125	5	125–130	3
125–130	1	130–135	9
130–135	4	135–140	3
135–140	2	140–145	1

TABLE X.—MEASUREMENTS COMPARED WITH BASI-NASAL LENGTH = 100.

	A.	B.	C.	D.
Cubic capacity	1264·7	1257·4	1222·8	1235·7
Maximum length	187	186·1	186·1	186·3
Ophryo-iniac length	179·8	182·2	182·2	182·1
Ophryo-occipital length ..	183·8	182·2	182·2	185·3
Maximum breadth	132·3	130·7	129·7	134·7
Bi-asterial breadth	109·1	107·9	107·9	109·5
Bi-stephanic breadth	104	101	100	108·5
Bi-auricular breadth	114·1	113·9	112·9	115·3
Minimum frontal breadth ..	94·9	97	97	98·9
External biorbital breadth ..	108·1	106·9	106·9	111·05
Bi-zygomatic breadth	129·8	131·7	129·7	130·5
Bi-malar breadth	116·7	117·8	116·8	121·05
Bi-maxillary breadth	92·9	93·7	92·8	98·9
Jugo-nasal breadth	101	101	100·4	105·3
Naso-mental length	112·1	112·9	111·9	114·2
Ophryo-alveolar length.. ..	95·95	97	97	93·7
Naso-alveolar length	67·2	67·3	66·3	71·05
Basi-alveolar length	101	102	102	102
Basi-nasal length	100	100	100	100
Basi-bregmatic length	129·3	129·3	128·7	127·4
Basion-obelion length	125·25	123·8	122·8	124·2
Basion-lambda length	115·15	113·9	112·9	113·7
Basi-iniac length	81·8	80·2	81·2	85·3
Basion-opisthion length ..	35·35	34·65	34·65	33·7
Breadth of foramen magnum ..	30·3	29·7	28·7	28·9
Orbital height	33·3	32·7	32·7	35·8
Orbital breadth	43·4	40·6	40·6	41·05
Nasal height	48·5	48·5	49·5	47·4
Nasal breadth	26·3	26·7	26·7	27·4
Palato-maxillary length ..	58·6	58·4	64·85	58·9
Palato-maxillary breadth ..	64·6	64·35	64·35	66·3
Arcs: Frontal	130·3	128·7	129·7	128·9
„ Parietal	129·3	127·7	126·7	127·9
„ Occipital superior ..	65·65	66·3	65·3	58·9
„ Occipital inferior ..	49·5	47·5	47·5	55·3
„ Supra-auricular	295·95	304	304	298·9
„ Oblique parietal	348·5	341·6	339·6	362·6
„ Jugo-nasal	113·13	111·9	111·9	116·8
„ Horizontal circumference	514·1	508·9	507·9	517·9
Anterior palatine breadth ..	29·3	29·7	29·7	29·5
Posterior palatine breadth ..	40·4	40·6	40·6	41·05
Minimum inter-orbital breadth.	25·25	24·75	24·75	27·9
Occipito-spinal length	194·9	193·1	193·1	195·8
Occipito-alveolar length ..	202	201	202	207·4
Mandible: Symphysial height..	31·6	31·7	31·7	35·3
„ Coronoid height ..	59·5	60·4	58·4	62·1
„ Condylar height ..	56·6	57·4	55·4	59·5
„ Gonio-symphysial length	80·4	81·2	81·2	84·7
„ Intergonial breadth..	96·3	97	96	96·8
„ Intercoronoid breadth	97·6	97	96	99·5

TABLE X.—MEASUREMENTS COMPARED WITH BASI-NASAL LENGTH = 100.—*continued.*

	A.	B.	C.	D.
Mandible: Intercondylar breadth, external .	115·75	116·8	115·8	118·9
„ Intercondylar breadth, internal	77·9	77·7	78·2	78·9
„ Breadth of ascending ramus	37·4	37·6	37·6	37·9
„ Basi-mental length ..	110·7	111·9	111·9	115·3
„ Ophryo-mental length	137·8	138·6	138·6	139·5
Length of parieto - sphenoid suture	(7·8) (9·4)	(7·9) (8·8)	(7·2) (7·9)	(6·8) (11·1)
Length of lacrymo - ethmoid suture	(8) (7·9)	(8·4) (7·7)	(8) (7·4)	(5·3) (7·4)
Height of posterior nares ..	24·3	25·5	25·5	24·8
Breadth of posterior nares ..	27·2	27·2	27	29·5
Length of floor of nasal cavity.	53·1	53·6	53·6	52·6
Least distance between temporal crests	93·8	88·7	86·6	111·6

Column A. All the skulls.
„ B. All the males.
„ C. Males without four doubtful specimens.
„ D. Females.

TABLE X.(*a*)—COMPARISON OF THE DIMENSIONS REDUCED IN PROPORTION TO BASI-NASAL LENGTH (AVERAGE) = 100.

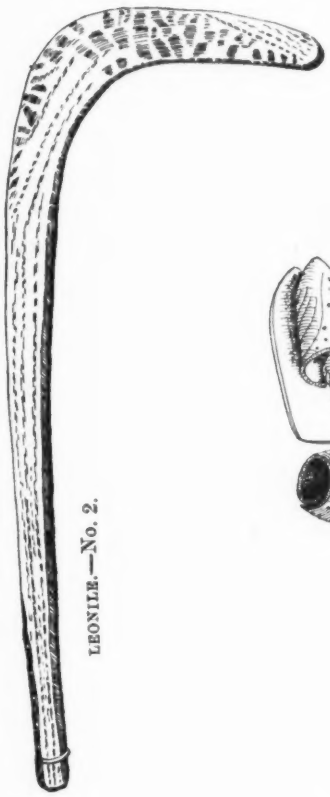
Series of skulls.	(12) Andamanese.	Fiji: (6).	Torres Sts.	Australians.	
Average value of basi-nasal length	95	104	103·4	101	Male skulls only considered.
Cubic capacity	131	144	137·5	122·2	
Maximum length	176	188	184·3	186·1	
Basi-bregmatic height	136	137	130·9	128·7	
Maximum breadth	142	123	125·7	129·7	
Minimum frontal breadth	97	93	95·1	97	
Bi-auricular breadth	120	112	114·6	112·9	
Horizontal circumference	505	512	498·4	507·9	
Supra-auricular transverse arc	300	289	283	304 (?)	
Frontal arc	127	130	124·6	129·7	
Parietal arc	129	138	126·4	126·7	
Occipital arc	109	118	114·5	112·8	
Length of foramen magnum	35	33	36·7	34·65	
Basi-alveolar length	101	103	106·6	102	
Bi-zygomatic breadth	132	131	130·8	129·7	
Bi-malar breadth	118	115	116	116·8	
Interorbital breadth	25	25	24·2	24·75	
Orbital breadth	38	38	39·2	40·6	
Orbital height	35	32	30 9	32·7	
Nasal height	48	47	46·6	49·5	
Nasal breadth	25	26	24·9	26·7	

TABLE XI.

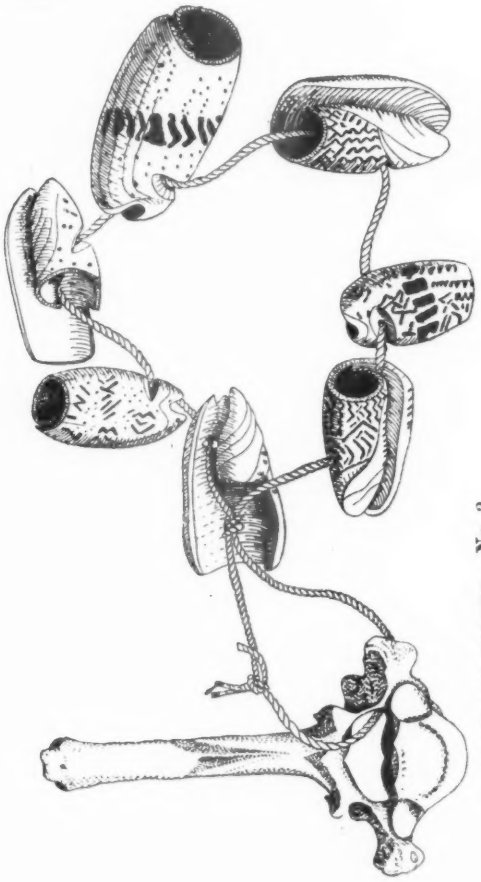
	No. of cases examined.	Occurrence on Right Side.	Occurrence on Left Side.	
Teeth struck out	33	2	1	In all three median upper incisor has been thus lost: the right in natives from New South Wales and Victoria respectively, the left in a South Australian.
Pterion ossides	31	5	4	And in one case only (No. 2137 from N. Territory) on both sides.
Pterygo-spinous ligament.. ..	17	—	—	Indications in seven instances, in nearly all these on both sides.
Anterior lacerate foramen ..	32	—	1	In seven cases nearly closed on both sides, in one on left side only.
Sphenoid contribution to glenoid fossa	32	2	1	The spine is prolonged thus in twenty-one cases on both sides, in two on right, in one on left only.
Post-condylar foramina	30	5	1	Are pervious in seven cases on both sides, in five on the right, in one on the left only.
Mastoid foramina	30	4	3	Occur ten times on both sides, four on the right and three on the left only.
Vesalian foramina.	33	4	7	Occur in twelve cases on both sides, in four on the right, in seven on the left only.
Styloid processes	17	—	—	In ten cases rudimentary, of considerable length in seven cases.
Para-mastoid processes	31	1	1	Very large in one case (male No. 2105).
Tuber maxillare	31	—	—	In eight cases is large, in two is insignificant.
Third occ. condyle..	33	—	—	Traces in five cases, especially distinct in No. 2137.
Ext. pterygoid fossae	27	—	—	Are deep in eleven cases, shallow in thirteen.
Ext. pterygoid plates	29	—	—	Project strongly in seventeen, moderately in nine, nearly vertical in three.
Infra-temporal crest	35	—	—	Distinct in twenty-nine cases, usually spiny, sometimes tuberous.
Post. palatine spine	28	—	—	In seventeen cases rounded, in six obtuse, in four acute, undeveloped in one.
Hamulus lacrymalis	22	9	8	Present in six cases on both sides.
Axes of orbits	34	—	—	Horizontal in eighteen, droop slightly externally in sixteen cases.
Infra-orbital suture	30	12	11	Present on both sides in eleven cases, in two on right only, traces in five other cases.
Fronto. max. suture	24	1	—	One case only.
Div. of malar	30	3	4	On both sides in three cases, on one side (the left) in one case only.
Div. of occipital	37	9	9	In nine cases, and in all on both sides.
Squamo-mastoid angle	38	—	—	Obtuse in thirty cases (in three reaches 180°), acute in six cases (nearly 90° in one), one synostosed.
Parietal foramina..	36	15	14	On right alone, eleven; on left alone, ten; on both sides, four; on neither side, eleven.
Spheno-maxillary suture outside orbit	29	11	10	In ten cases on both sides, in one case on right only, absent from seventeen cases.

TABLE XII.—AVERAGES OF INDICES FROM ALL AVAILABLE DATA.

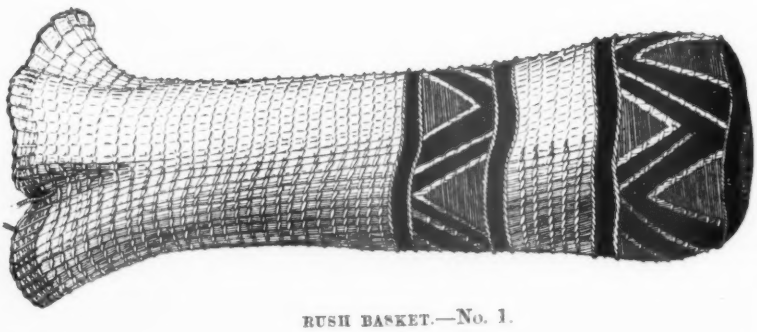
Measurement of Index.	All skulls.	No.	Male skulls.	No.	Female skulls.	No.
Cubic capacity	1246·5	150	1297	97	1148·5	49·
Cephalic index	70·95	214	70·25	111	72·4	53·
Vertical index	71·5	171	71	108	71·4 (?)	52·
Alveolar index	101·1	114	100·4	73	103·1	33
Nasal index	55·1	169	55·75	77	54·9	26
Orbital index	81·3	175	80·2	101	84·9	46
Stephano-zygomatic index	82·05	133	79·8	95	85·6	35
Palato-maxillary index	110·1	63	112	44	110·3	14·
Total facial index	99·4	21	96·2	10	93·6	2
Superior facial index (Broca)	68·9	74	68·5	31	68·2	10·
Superior facial index (Kollmann)	49·9	54	49·9	36	49·8	11·
Gonio-zygomatic index	71·9	40	71·6	25	70·1	7·
Dental index (Flower)	45·3	49	45·1	30	46·5	16·



LEONILE.—No. 2.



MUSICAL INSTRUMENT.—No. 3.



RUSH BASKET.—No. 1.

On an unusual form of RUSH BASKET *from the* NORTHERN TERRITORY *of* SOUTH AUSTRALIA. By R. ETHERIDGE, Jun.

[WITH PLATE XVII.]

A VERY interesting and unusual type of rush basket has lately come under my notice, from the Northern Territory of South Australia. For an opportunity of describing this abnormal shape amongst Australian baskets, I am indebted to the kindness of Mr. Harry Stockdale, of Sydney, the Northern Territory explorer and hunter. It was obtained from the Alligator Rivers Tribe, a people inhabiting the country watered by the three rivers of that name flowing into the south-east corner of Van Diemen's Gulf (lat. 12° 0′ S., long. 132° 0′ E.). The basket is peculiar by reason of its crumpled, bell-shaped mouth and ornate colouring.

With few exceptions the neat-made baskets of the Australian aborigines are wide, open-mouthed receptacles, and are either circular and truncated, flat-bottomed and straight-sided, or even slightly tapering, when they are known in the south as *Kal-la-ter*[1]; or flat and circular, with a contracted mouth on the side, called in South Australia, *Pol-la-da-noo-ko*;[2] or, of the North Queensland type, large, wide, bulging, open-mouthed, and more or less flexible, with curved semi-cuneate bases.[3]

In the present instance the basket is cylindrical, narrow, and practically flat-bottomed, sufficiently so to enable it to stand alone, decreasing in size upwards to a comparatively narrow neck, and then expanding to a somewhat crumpled, bell-shaped mouth, with one diameter greater than the other. The width at the bottom, which is slightly inflated, is 3½ inches; at the neck, 2¾ inches; and across the expanded mouth, 5 inches; the height is 11½ inches. The proportions and colouring, although simple and conventional, by no means display a lack of taste on the part of the aboriginal maker. The material of which the basket is made is evidently a small rush, or coarse grass, and its structure consists of a series of "stakes," close and parallel, intertwined alternately over and under by thinner "siding" of the same material. The "stakes" have an average width of rather more than one-sixteenth of an inch, whilst that of the "siding" is less. The "stakes" are practically close together, but as the bottom is receded from, an almost imperceptible widening out takes place, so as to form the expanded mouth, but the spacing of the "siding" is remarkably regular and well kept. The edge

[1] Eyre, "Journ. Exped. Discovery into Central Australia," 1845, ii, p. 512.
[2] *Ibid.*, 1845, ii, p. 512.
[3] Lumholtz, "Amongst Cannibals," 1890, pp. 190, 195, and 276.

of the mouth is guarded by a margin of bistrand string, made of beaten and twisted fibre, and this is also whipped over and over the immediate periphery of the basket to a depth of three-eighths of an inch. Immediately below this, by bringing the three uppermost sidings together, a series of holes is left, thus giving a better definition, or finish to the mouth-edge, and forming an open sub-marginal band. (No. 1.)

The colouring is remarkably well effected. In the first place there are four concentric narrow black bands, from two to three-eighths of an inch wide, gradually becoming further apart from the base upwards, and defended at each edge, top and bottom, by a raised rim of interlaced native string. These black bands separate the surface of the basket into three rather unequal zones. The uppermost of the black bands is six inches from the mouth margin, and the whole of this space is plastered with white pipe-clay. The lowest black band forms the periphery of the flat bottom of the basket. The latter and the second zone are also coated with white pipe-clay; but the first and third, or bottom, zone are divided into triangular spaces, by black and white lines. The bottom zone contains eight of these triangular spaces, and the top zone six. Each triangle is first margined by a narrow white pipe-clay line, then a broader black line, or almost band, again followed by another white line. The triangles have their apices alternately directed upwards and downwards, and are not all of equal size. They are coloured a deep Indian red, and present a slightly sparkling appearance, from the presence of mica scales in the clay from which the pigment has been prepared. It is quite evident that both the top and bottom zones containing these triangular spaces were first wholly coloured Indian red, and then the black and white lines painted over the latter pigment. The basket is remarkably light, weighing only 2½ ounces. With regard to its special use, I am unable to afford any definite information, but both its construction and lightness would appear to indicate that it could not have been put to any great degree of rough usage.

The Alligator Rivers Tribe, from which this basket emanates, appear to have been great adepts in the manufacture and colouring of these weapons and utensils. I have lately had the pleasure of examining a large series of these, and they all bear out this view.[1]

I am indebted to my colleague, Mr. Charles Hedley, F.L.S., for the accompanying excellent drawing of the basket.

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[1] See the forthcoming "Macleay Memorial Volume" of the Linnean Society of New South Wales.

On a Modification of the AUSTRALIAN ABORIGINAL WEAPON, *termed the* LEONILE, LANGEEL, BENDI, *or* BUCCAN, *&c.* By R. ETHERIDGE, Jun.

I AM indebted to Mr. W. H. Hargraves, Deputy Master-in-Equity, Sydney, for an opportunity of noticing an interesting modification of the Australian weapon known as the *Leonile* or *Langeel*. It is one of the lesser known weapons, but appears to have been used by the aborigines of Victoria, New South Wales, and Queensland. The *Leonile* consists, speaking generally, of a more or less long straight handle, or shaft, and a sharp pointed head, of greater or less length, either at right angles to the former, or opposed to the shaft at an angle somewhat greater than a right angle. It is used in single combat, and is one of the most deadly weapons amongst the aborigines themselves, "because of the facility with which the point can be suddenly turned at the moment of striking."[1] The combatants are protected, when in combat with this weapon, by the small, flat-faced and angular-backed shield, formerly termed by the Victorian blacks, the *Mulga*.

Considerable variation seems to exist in the relative length of head to shaft, and the width at that point where shaft and head may be said to meet. In the Victorian weapon, figured[2] by the late R. B. Smyth, the enlargement is, in proportion, greater than in our specimen, the head of moderate length, tolerably thick, and fined off to an obtuse rather than an acute point. Smyth's figure gives one the idea of a roughly finished weapon, except at the immediate handle, or hand-grasp, where it is elaborately carved, with vertical lines filled in transversely with herring-bone sculpture and figures on the shaft above. On the shaft is a rhomb with dots, and two indistinct figures, but rather resembling insects.

The modifications figured by the late Governor G. J. Eyre are very marked. One[3] exhibits the short and acutely pointed head absolutely at right angles to the shaft; a second[4] is much enlarged and thickened at the distal end of the handle, with a short head forming almost an acute angle with the former. In the third modification,[5] the union of the head and handle forms a more obtuse angle, and approaches nearer to Smyth's figure,

[1] "Aborigines of Victoria," 1878, i, p. 302.
[2] *Ibid.*, f. 62.
[3] "Journ. Exped. Discovery into Central Australia," 1840–41 (2 vols., London, 1845). Vol. II, Pl. III, f. 13.
[4] *Ibid.*, Pl. III, f. 12.
[5] *Ibid.*, Pl. III, f. 11.

except that the head is bluntly pointed. The fourth[1] and last of Eyre's figures represents a very extraordinary weapon, more like an openly-curved sickle, set on a long, slightly bent handle, than anything else it can be compared with. It retains the same width throughout, no apparent difference between head and shaft being noticeable, but terminating distally in a very sharp point. Three out of the four are sharpened at the proximal end, and all are transversely carved to afford a firm hold for the combatant.

Lieut. Breton, R.N., many years ago figured[2] "a formidable weapon, used at Port Macquarie;[3] its length is 3 feet, and the arm (if it may be so termed) about 18 inches more." The *Leonile* in this case, for no other weapon can be intended by the author, consists of a cylindrical handle, gradually enlarging upwards to its union with the head, which is absolutely at right angles to the former, and thence tapering in an inverse ratio to the distal point of the weapon. Allowing for a certain amount of conventionality in the figure, I cannot do better than compare Breton's figure of the *Leonile* to a mason's or carpenter's square.

The present weapon, represented in the accompanying figure (No. 2) has a total length of about 2 feet 5 inches. The shaft is hardly straight in any part, but is comparatively so for about 1 foot 9 inches, thence gently curved round into the head, which is for all practical purposes at right-angles, with an obtuse distal end. As compared with other modifications of this weapon, the head is short. The only attempt at ornamentation consists of a transverse ridge, close to the proximal end, probably to give a firmer grasp to the hand of the holder. The weapon is an exceedingly well finished one, made from a handsome variegated wood, which may possibly be that of the "Beantree" (*Castanospermum australe*), a leguminous wood not unlike walnut. It weighs 1 lb. The width of the shaft at the point held by the hand is $1\frac{1}{2}$ inches; at its widest point $2\frac{1}{2}$ inches; whilst the length of the head is 6 inches.

Compared with the published figures of the *Leonile*, our weapon is unquestionably of a much more finished type. It is not precisely like either of the four illustrations given by Eyre, and, as compared with that of Smyth, lacks the carving of the handle, gradate nature of the immediate proximal end, and the figures on the shaft. Judging, however, by the shading of the latter, the present weapon appears to be a much more finished one, in

[1] *Ibid.*, Pl. III, f. 10.

[2] "Excursions in New South Wales," &c., 1830-33 (8vo., London, 1833), p. 238.

[3] "Aborigines of Victoria," 1878, f. 62.

so far as the actual shape, make, and surface fining-down are concerned.

The name *Leonile* or *Langeel* is applied to this weapon in Victoria proper, but in South Gippsland, about Lake Tyers, the late R. B. Smyth believed it was known as *Darn-de-wan*. We have Lieut. Breton's statement that it was known at Lake Port Macquarie, New South Wales, although he does not supply a local name for it. I am informed by Mr. Robert Grant, Zoological Collector to the Australian Museum, Sydney, that the *Leonile* is known in the Bellinger, Clarence, Tweed, and Nambuckra Rivers Districts as *Coupon*, and, in all probability, that now under description comes from hereabout, as the exact locality is unknown. Carl Lumholtz figures a short-headed, long-handled *Leonile*, closely resembling a single-headed miner's pick, from the Herbert River District, Central Queensland, where it is known as *Bendi*.[1] It is made from the wood of the *Eucalyptus exurata*. The weapon is also known in the Moreton and Wide Bay Districts, Queensland, where Mr. Archibald Meston, of Brisbane, informs me it is called *Buccan*.

The following table shows the local names and distribution at a glance.

Locality.	Name.	Authority.
Victoria generally	*Leonile* or *Langeel*.	R. B. Smyth.
South Gippsland	*Darn-de-wan*.	"
Port Macquarie, N.S.W.	——	Breton.
Bellinger, Clarence, and Tweed River Districts, N.S.W. ..	*Coupon*.	R. Grant.
Moreton and Wide Bay Districts, Ql.	*Buccan*.	A. Meston.
Herbert River District, Ql.	*Bendi*.	C. Lumholtz.

Mr. R. Grant says that in the district where he has observed this weapon (Bellinger, &c.), advantage is taken by the blacks of any large protruding excrescence from the trunk, and the *Coupon*, as they call it, is then cut out of it cross-wise. I also think little doubt can be entertained that, from the appearance of Eyre's illustrations, roots have been taken advantage of to fashion this remarkable weapon.

Some diversity of opinion seems to exist as to the method of using the *Leonile*, whether the point or the round is used in striking. As a matter of fact, both appear to be employed. Lieut. Breton[2] tells us that the object of its peculiar shape is

[1] "Amongst Cannibals," 1890, p. 332.
[2] *Loc. cit.*

"that the warrior may be enabled to strike round the shield, or eleman, of his adversary." Mr. G. F. Lang[1] relates a case where an intended husband, when beating an eloped girl, "finished by driving the point of his liangle into the crown of her head." The object of striking over the guard, afforded by the shield, with the point, has been confirmed by Messrs. Meston and Grant, both of whom have seen the *Leonile* used. Mr. Grant further states that when a combatant wishes to strike side-wise and from himself with a back-handed blow, the round, and not the point, of the *Leonile*, is used. Perhaps, after all, the most peculiar mode of using it is that related by Lumholtz, who says that about the Herbert River, fighters "try to hit the kidneys of their opponents," that being the most vulnerable point to the aborigine mind.

As in the case of the basket, I am indebted to Mr. Charles Hedley, F.L.S., for the accompanying drawing.

An AUSTRALIAN ABORIGINAL MUSICAL INSTRUMENT. By R. ETHERIDGE, Jun.

THE recorded instances of the use of Musical Instruments amongst our aborigines are, comparatively speaking, so few, that the description of an authenticated instrument will probably prove welcome. For an opportunity of describing the present example of what may, for the want of a better name, be termed a rattle, or perhaps even "castanets," I am indebted to the well known Australian traveller and explorer, Mr. Harry Stockdale. The instrument was obtained 100 miles inland from Port Douglas, near Cairns, on the north-east coast of Queensland. Before proceeding to describe this interesting object, I may perhaps, be allowed to refer to what is generally known of the use of instruments of music amongst the Australian aborigines, or, at any rate, their rough and ready make-shifts for the more finished appliances of cultured peoples. During the widely spread dance generally known as the *Corroboree*, or, more particularly in Victoria as *Ngargee, or Yain-yang*, the women of the tribe, who take the part of musicians, are seated in a semi-circle, a short distance from the large fire lit on these occasions holding on their knees opossum rugs tightly rolled and stretched

[1] "Aborigines of Australia," 1865, p. 11.

out. These are struck by the right hand, in time with the action of the master of the ceremonies, usually one of the old men. He carries in each hand a corroboree stick, and these are struck together, accompanied by a nasal drone. Many of the dancers are similarly provided.[1] This use of the opossum cloak and clanking of the sticks appears to be the most primitive form of musical instrument, if it can be so termed, amongst our aborigines. The eminent surveyor and explorer, the late Sir F. L. Mitchell, in describing[2] their "universal and highly original dance," refers to the rolled up skins in the following words—"and thus may be said to use the tympanum in its rudest form." On the Maranoa River in Queensland, a modification of this opossum-cloak drum is in use, by rolling up earth inside the skins, and then striking with a stick.[3]

The Rev. G. Taplin states that amongst the Narrinyeri, a tribe inhabiting the country about the Lower Murray River, and the Lakes Alexandrina and Albert in South Australia, the rolled up skin drums are called *planggi*, and the act of drumming, *plangkumbalin*. The corroboree sticks are *tartengk*, and the act of striking them together is termed *tartembarrin*. The dance is known to this tribe as *ringbalin*.[4]

On the other hand, amongst those of the Northern Queensland tribes who use boomerangs, the latter are employed in the dance in place of one of the sticks, or to beat time.[5]

In Western Victoria, amongst the local tribes, the rolled up rugs sometimes contain shells, so as to produce a jingling sound. According to Mr. J. Dawson,[6] who mentions this fact, the "music stick" is made of hard wood, 9 inches long, by 1½ inches in diameter. It is rounded, and tapers at each end to a point. One stick is held fast and struck by the other, producing a clear and musical sound. A still further modification exists on the Herbert River, in Central Queensland, where the female musicians beat "both their open hands against their laps (or, more probably, their buttocks) thus producing a loud hollow sound."[7]

The Brothers Tardine, during their memorable journey, in 1867, from Port Denison to Cape York, saw two drums in use near Newcastle Bay, obtained by barter from the Torres Straits

[1] Smyth, "Aborigines of Victoria," 1878, i, p. 167.
[2] "Three Expeditions into the Interior of East Australia," 1838, ii, p. 5.
[3] G. S. Lang, "Aborigines of Australia," 1865, p. 28.
[4] Wood's "Native Tribes of South Australia," 1879, No. 1. "The Narrinyeri," by Rev. G. Taplin, p. 37.
[5] Palmer, "Journ. Anthrop. Inst. Gt. Brit. and Ireland," 1884, xiii, p. 287.
[6] "Aborigines of Australia," 1881, p. 80.
[7] Lumholtz, "Amongst Cannibals," 1890, p. 236.

Islanders, and clearly of a Papuan type. These were neatly made of a solid piece of wood scooped out, in shape like an elongated dice-box. One end was covered with the skin of a snake or iguana, and the other left open. Such drums were termed *waropa* or *burra burra*.[1]

The use of drums also extends to Western Australia, for Ogle observes that a "kind of drum, made of kangaroo skin stretched over a bundle, and beaten with the fists," is employed.[2]

Advancing a step further, to instruments of a more truly musical nature, we find that Capt. J. Lort Stokes, R.N., saw in use at Port Essington, during a corroboree, a bamboo trumpet. It consisted of a piece of bamboo, thinned from the inside, through which the performer blew with the nose, producing a kind of droning noise. This pipe was from 2 to 3 feet long, and was called *ebroo*.[3] It is evidently the same instrument as that spoken of by Dr. Coppinger,[4] who saw at a camp of the Larikia Tribe, in the vicinity of Port Darwin, pieces of "hollow reed," about 4 feet long, that were blown "like cow-horns," and produced a "rude burlesque of music." In the forthcoming "Macleay Memorial Volume" of the Linnean Society of New South Wales, I have described similar trumpets in detail, used by the Alligator Rivers Tribe at Van Diemen's Gulf, North Australia.

The rattle now under description consists of seven shells strung on string, and suspended from a vertebra. The shells are two species of olive, *Oliva episcopalis*, Lamk, and *O. elegans* Lamk. The apices have been completely ground off, leaving only two body whorls, and these have been transversely cut through. The string, which is two-ply, and made of fibre, dyed brown, is passed through the hollow body whorls of the shells and out through each slit on the backs. The two parts are brought together and knotted, so as to form a loop. One of the free ends is then put through the neural canal of the vertebra, and tied. In two of the shells the string passes directly through the slits, and not vertically down the body whorl at all. The vertebra is one of the anterior dorsal of a dog. The jingle caused by shaking the shells is pleasant and melodious, the vertebra being held in the hand.

The genuineness of this rattle as an Australian instrument, in the first instance, is, of course, not absolutely assured, for the type seems to me to have a decidedly Papuan appearance. Whether

[1] *Vide* Smyth, "Aborigines of Victoria," 1878, i, p. 174.
[2] "Colony of Western Australia," 1839, p. 61.
[3] "Discoveries in Australia," 1837–43, i, 1846, p. 394.
[4] "Voy. 'Alert,'" 1883, p. 204.

it was simply adapted from a Papuan pattern, or directly obtained by means of barter, is, of course, open to conjecture. At any rate, it was found in the hands of blacks, 100 miles inland from Port Douglas, situated to the north of the town of Cairns, on the north-east coast of Queensland. (No. 3.)

Count D'Albertis figures[1] a few New Guinea musical instruments, amongst them what seems to be a cluster of shells, nuts, or some other small and like objects attached to the end of a flexible handle, and used, I should imagine, as a rattle. Similarly Prof. A. C. Haddon describes[2] the musical instruments in use by the Western Tribe of Torres Straits Islanders as consisting of drums, a primitive kind of rattle, and two sticks that are beaten together. He also adds that "empty seeds (*goa*) or shells are often attached to masks or drums to serve as rattles. When dancing, the rattle seeds may also be attached to a stick held in the hand, or slung on a belt and hung in a bunch behind, or rattles may be tied on to the arms or ankles."

These quotations show, I think, the derivation of our shell rattle from the Papuan idea, and indicate, in conjunction with a number of other facts which could be brought forward, the close relation that has existed at times between our aborigines and the Papuans by means of their intermediaries, the Torres Strait Islanders.

The extensive system of barter carried on over the whole continent of Australia, may almost be described as a natural characteristic of the aboriginal Australian. The great distances that articles of utility as well as what may be called nick-nacks travel, passing from tribe to tribe, is remarkable, and according to Mr. A. W. Howitt[3] is "spread all over the interior of the continent." In nothing is this more prominently shown than the occurrence inland of marine shells. Hodgson[4] saw mother-o'-pearl in the Condamine country that must have travelled as much as 100 miles inland. Leichhardt relates several instances: thus at Ant Hill Creek, in the Mount Lang District, Queensland, the local tribe journeyed to the sea coast in quest of shells, particularly the pearly nautilus, "of which they make various ornaments"[5]; this party found a *Cymbium* in the dillybags of the Lynd River natives,[4] a subsidiary stream flowing into the Mitchell River in Cape York Peninsula; and at the camping place[6] of the Albert River men a *Cytherea* and a *Dolium* were

[1] "New Guinea," 1880, i, pl. opp. p. 305, f. 20 and 31.
[2] "Journ. Anthrop. Inst. Gt. Brit. and Ireland," 1890, xix, p. 374.
[3] "Journ. Anthrop. Inst. Gt. Brit. and Ireland," xx, p. 76, *note*.
[4] "Reminiscences of Australia," 1846, p. 248.
[5] "Overland Expedition, Moreton Bay to Port Essington," 1848, p. 257.
[6] *Ibid.*, p. 279.

observed.[1] Even as far inland as the Dieri Tribe, who inhabit the country about Coopers Creek, East Central Australia, the single valve of a large marine shell was seen by Howitt.[2]

For the excellent drawing accompanying this paper I am indebted to Mr. Charles Hedley, F.L.S.

The ABORIGINES *of* NORTH-WEST AUSTRALIA.

By P. W. BASSETT-SMITH, Surgeon R.N.

[WITH PLATES XVIII AND XIX.]

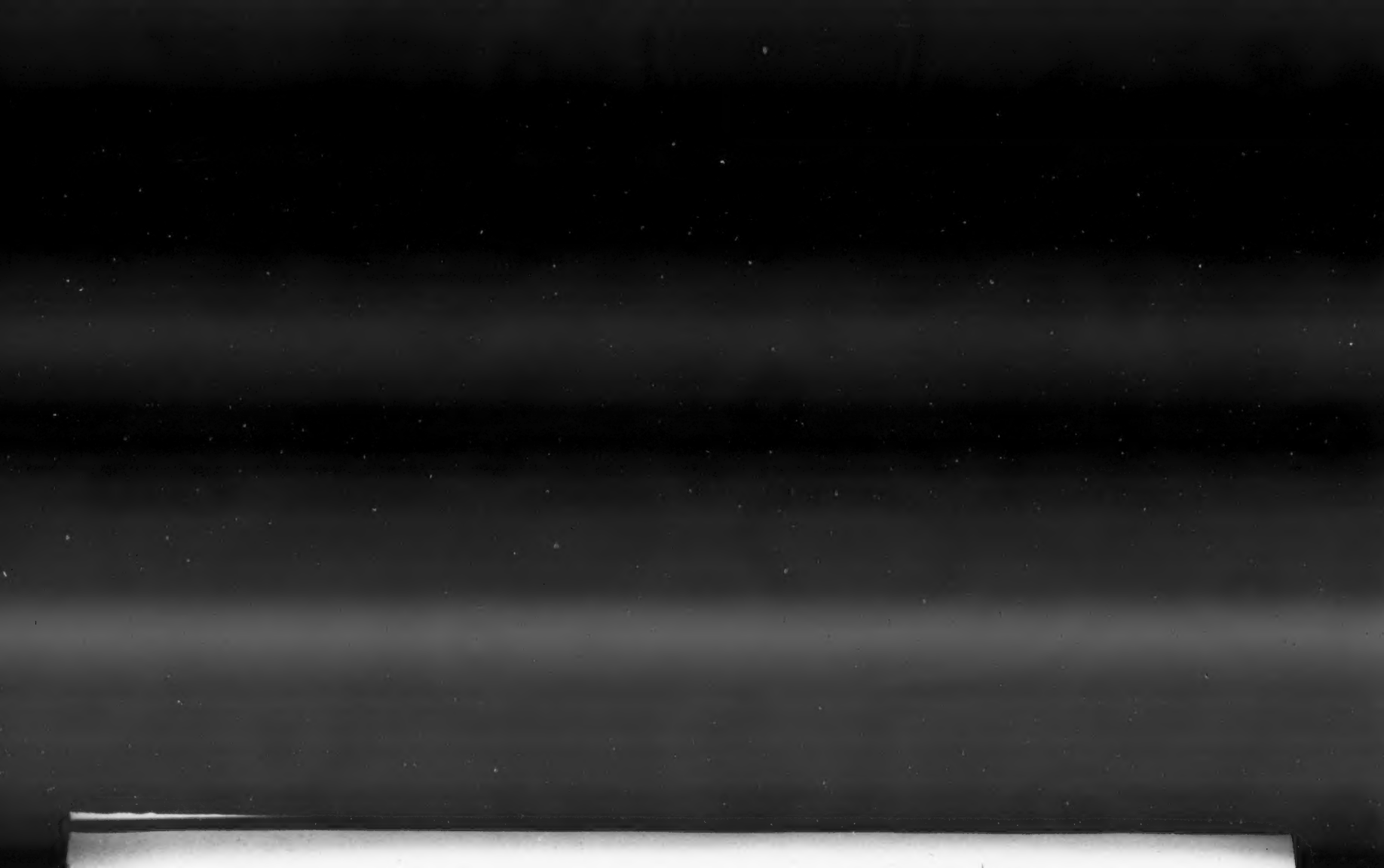
FOR rather over three months after joining H.M.S. "Penguin," a surveying ship employed on the Australian station in 1891, it was my good fortune to see many of the aboriginal natives of that country, who, in the north-west part, are and have been less in contact with civilized or western man than in any other portion.

The personal observations of the natives themselves were obtained near Port Darwin, and particularly from a camp on the Adelaide River, 80 miles from that place, where there is a station on that part of the northern commencement of the trans-continental railway which as yet only reaches the gold fields, some 160 miles up; here the only Europeans were the stationmaster and his wife, with a single police trooper; also from Roebuck Ray on the West coast, lat. 18·0° S., at the so-called town of Broome, there being only the telegraph establishment with six Europeans, one wretched hotel for use of the "pearlers," a post office, and an agent of Streeter's with a few Japanese, so that here the influence of outsiders cannot be very great on the natives.

Observations of their camps, &c., were also made on a few of the islands, and once on the mainland, but on these occasions I never saw any natives, though there is good reason to believe that they were sometimes very close by. Before I joined the ship, however, boating parties had been attacked by small troops of natives coming out with a rush, and throwing spears, sticks, paddles, &c., so that great care had always to be taken, and they were frequently sighted by officers at different times.

A short description of the climate and general character of the country is necessary to enable us to understand the natural conditions under which the people live.

[1] *Op. cit.*, pp. 348, 356, and 359.
[2] *Op. cit.*, p. 76, *note*.



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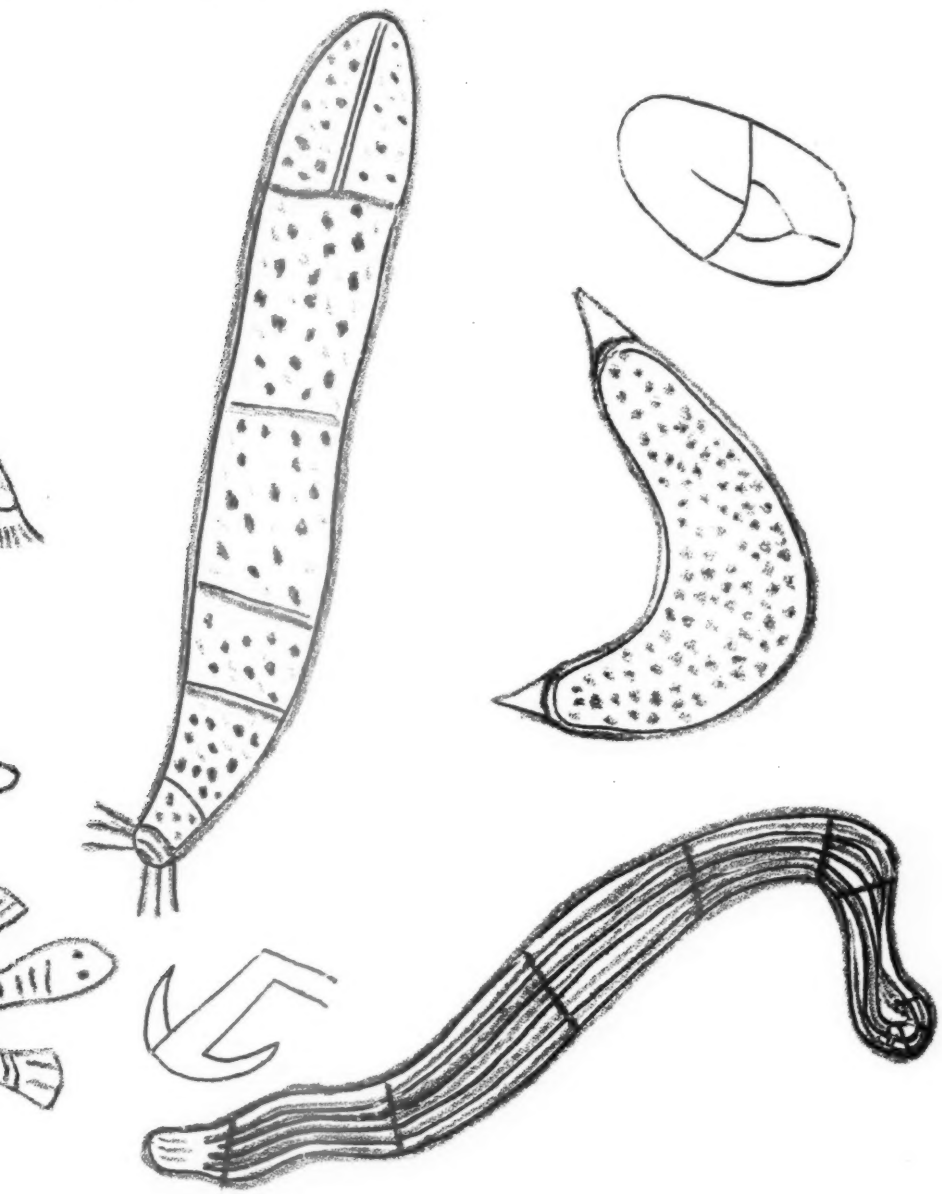
IN CAVES.
ADMIRALTY GULF.



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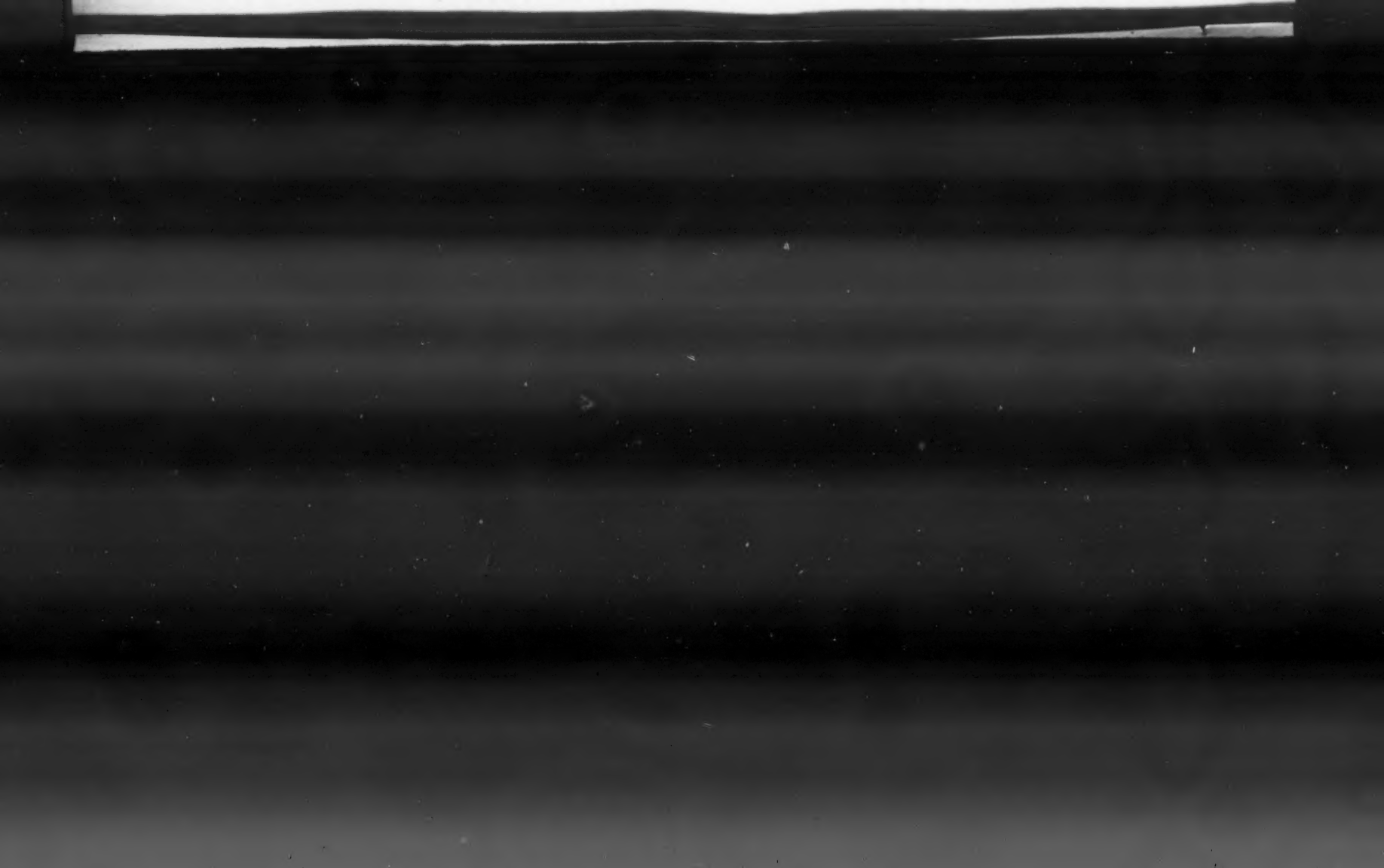


Situated between 11 and 18 degrees of south latitude, the intensity of the sun's rays is very great, this with a very long dry season, sometimes nine months without rain, produces a heat of the ground very excessive, that is during the South-East trade, which blows right across the continent, and is absolutely dry, so that almost all the water holes, and all the lowlands become dried up during this season, to become extensive swamps again after the heavy rains of December and January. The heat in October up the Adelaide River, at an elevation of some 400 feet above the sea, as I know to my cost, very readily produces fever, and except in the early morning, and in the evening it was impossible to do any work, or collecting out of doors, the wind having a scorching heat as if from the blast of a furnace, and the glare from the dry dusty earth being blinding; unfortunately I had no thermometer to take accurate observations. These conditions naturally prove fatal to any but the most hardy animals and plants, and that with these poverty-stricken surroundings, the inhabitants are miserable and repulsive is not surprising.

The northern part near Port Darwin geologically had a foundation of felsites and micaceous schists; on these about 4 feet of soft yellow ochreish clay, next about 30 feet of white rock unaffected by acids and containing much iron, probably a ferro-silicate of magnesia, topped by a ferruginous sandstone, and conglomerate; at the Adelaide River the felsites outcrop at the tops of the hills. Round Admiralty Gulf and Roebuck Bay the mainland is very flat, and the islands low and table like; here the felsites again are found, but the white rock has disappeared, and they are covered by beds of fine quartzite, and coarse ironstone conglomerate. The ochres are used by the natives extensively for staining their bodies and weapons, the silicate rock is eaten for its purgative properties, and the schists and quartzites are used for making spear heads, &c. The whole country except close to the rivers being covered by a thin shadeless bush of eucalyptus, and acacia trees, with a few cycads, and coarse tall grass underneath.

Throughout the whole region the natives were very thinly scattered, and are divided into a large number of different tribes, each being again split up into a number of camps, the members of the latter always keeping together, and having a headman, who in the chief camp of the tribe is called "king," and has a considerable amount of authority, having many wives and power of giving women away to be wives of others. As the weapons of these tribes differ considerably it will be well to take them more in detail.

There was one camp near the station on the Adelaide River

of the Woolwonga tribe consisting of about thirty men, women, and children; it was not always in the same spot, though generally on the banks of the river in a small clearing; their means of shelter were nil (at both my visits, July and October), but at night time they would light a number of small fires, and around each would crouch, six or seven of both sexes, together with children with absolutely no clothing on; there was no hut of any description, and even in the wet season they only put up a few branches for protection.

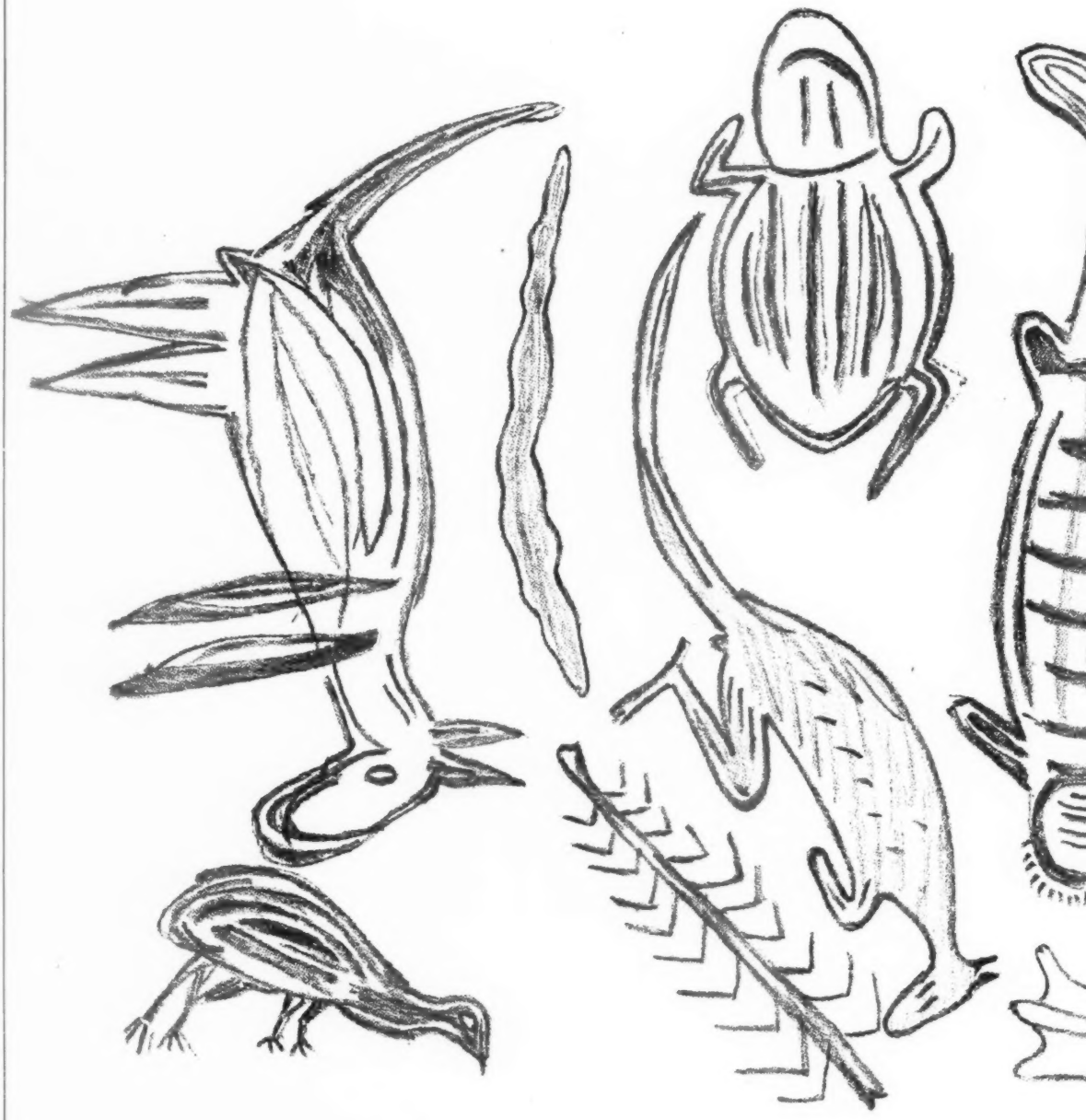
I obtained the following measurements from them:—

	No. 1 Man.	No. 2 Man.	No. 3 Woman.	No. 4 Boy about 15.
Height	5 ft. 9½ in.	5 ft. 5 in.	5 ft. 3½ in.	5 ft. 1½ in.
Chest circumference ..	32½ in.	33½ in.	30½ in.	26 in.
Head, length	7 13/16 „	7 8/16 „	7 6/16 „	6 13/16 „
„ width	6 „	6 „	5 8/16 „	5 6/16 „
„ index	77	80	75	80
„ circumference ..	22 12/16 in.	22 in.	21 in.	20½ in.
Length of face ..	8 „	8 „	7½ „	7½ „
Upper extremity ..	30½ „	28½ „	28 „	26½ „
Lower „ from A.S. spine of ilium	38½ „	36 „	36 „	35½ „
Wrist circumference ..	5½ „	6 „	5½ „	6 „
Ankle „ ..	7 „	7½ „	7 „	7½ „
Hair „ ..	Curly.	Strong lank.	Breasts, pendant.	—
Beard „ ..	Strong wiry.	Slight.	—	—

N.B.—The width of the heads is too great owing to the thickness of the hair on either side.

(Sketches are preserved in the Institute's collection.)

The colour of the skin varied from a brown black to almost a pure black, though frequently coated with ochre, which they are very fond of doing. The hair of the head was thick, coarse, and curly; the beard, generally present, thick and wiry; the head long and prognathous; eyes, deep set; nasal bones depressed; nostrils, large dilated; and lips, thick. Their legs have practically no calf muscles, yet they can walk great distances; their carriage, especially among the young women, or "lubras," being graceful and pleasing, as springy and upright as possible; they are all very expert in the water, dive and swim admirably, but rarely ever run; they seem to be of a contented disposition, laugh and talk a great deal, especially at night time, singing and noise going on the whole of the dark hours often, in fact they seem to sleep much more during the day than at any other time.



WOOLWONGA TRIBE DRAW

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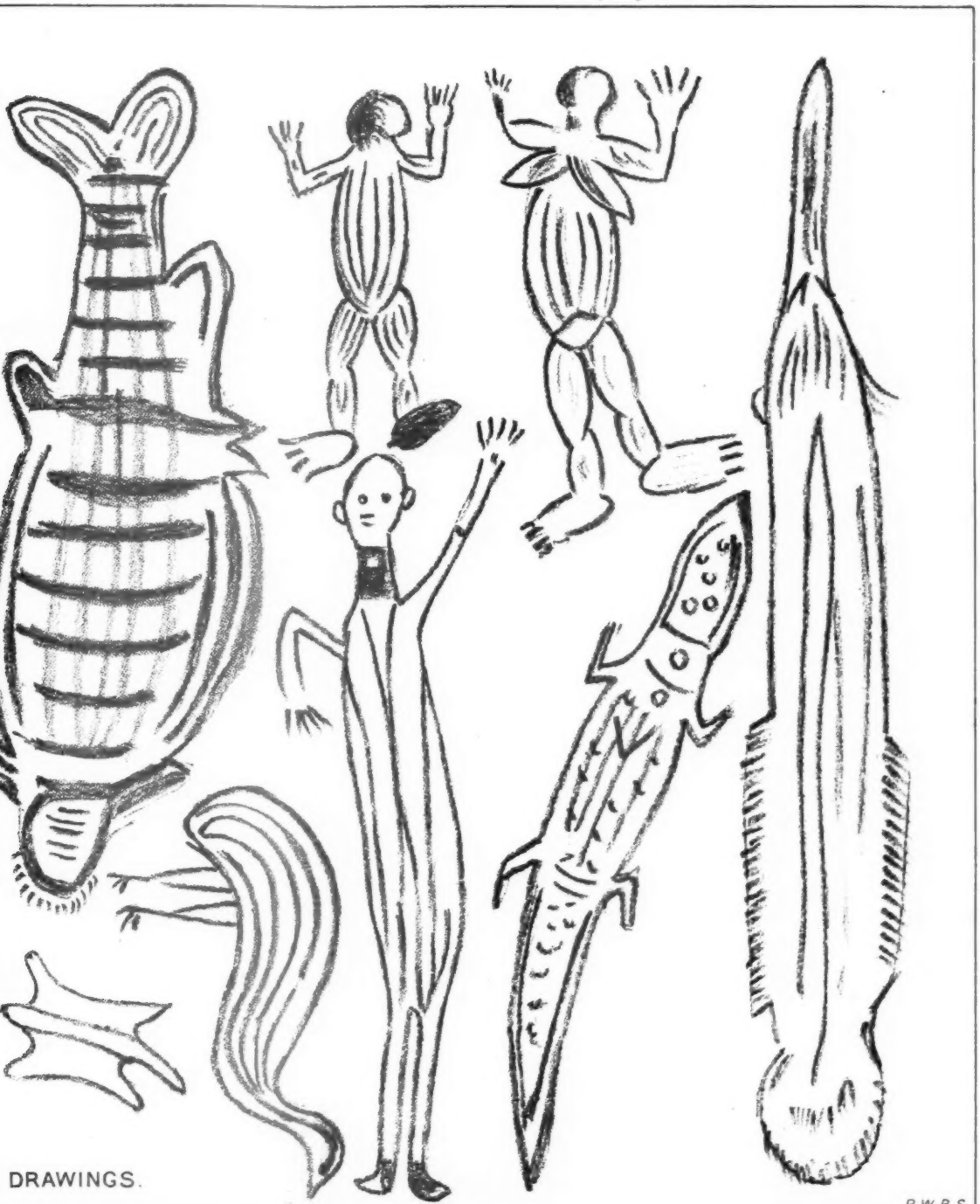

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The scars are usually very numerous, standing out much above the general level of the skin; they are inflicted with stone knives (quartzite), earth being rubbed into the wound; the first ones I was told were made on the shoulders at about seven years old, frequently one yearly, and at puberty they are made on the belly: the "lubras" are also scarred, but not so much as the men. Circumcision, or splitting the prepuce as a rite, is universal, and is usually performed early in the morning, at 4 or 5 a.m., the whole tribe being gathered together. Women, when pregnant, are debarred from eating many kinds of meat, kangaroo, &c., and a mother-in-law must not speak to her prospective son-in-law. Polygamy is allowed, though not common, and cases of adultery are generally punished by death.

There were, as far as I saw, no idols, or signs of any religion, but they believe in a Devil Devil, who comes out of the water, and goes about at night, they therefore are afraid to do so themselves; they are very superstitious with regard to diseases; no man can die unless he has been bewitched; someone is supposed to come at night and take away the fat out of the man's belly, and his friends must find out who did it to kill him—this blood price often extending to the whole family of the suspected one.

The men are great hunters; when after kangaroo, they daub themselves all over with the red earth, and carry a bough if in the open, and rarely return without being successful. At one "billibong," or water hole, I saw a boy creep in, swim across under water, and stealthily get among the reeds on the other side; having seized a duck sleeping there, he carried it about for a short time hugging it, then plucking it alive, he put it in the ashes to cook, thus showing his cruel nature. Another man finding a bandicoot's hole, thrust his arm in, and in spite of bites, pulled the animal out, singed it in the fire, *bit* open the abdomen, removing the entrails, thrust it in the ashes again for a few minutes, and then ate it tail first. A quantity of fish were caught, one an Osteoglossum, about 2 lbs. weight, I was anxious to secure in perfect condition, but a native seized it with his teeth just behind the head dividing the backbone, their usual way of killing big fish.

The only ornaments worn were bands of plaited grass round the arms and legs and a girdle of hair and fibre round the loins, which when once on cannot be removed; the lubras had short cloth petticoats (not native make). The front incisor teeth were not defective.

Their weapons consisted of very long wooden spears, about 12 feet long, ornamented with red and yellow ochre, and white bands, being strongly barbed either on one side, both sides, or

three pronged and barbed, or else having a quartzite head fixed on by gums and fibre; short spears either partially of bamboo or wholly of hard wood; these were not barbed, but occasionally pointed with bone; these latter are mostly used for kangaroo hunting.

Supple wands about 4 feet long terminating in a nipple are used, these are called "Woomeara," and are for throwing the spears, which is done with great accuracy and force. This is the more remarkable as the length of the spears and Woomeara causes them to be in constant vibration while in the act of poising for aim. With the long spears 70 yards was the greatest distance I saw thrown, the small ones aimed up in the air went quite out of sight; the natives, however, apparently did not like showing their powers, and did not do their best.

Some flattened clubs were seen, which I believe are only used among the Alligator tribe further west. I did not see any shields or stone axes, and they do not use the Boomerang or Kiley. Besides their weapons, the only articles they make seem to be coarse baskets and creels for carrying shell-fish, fruit, &c.; they apparently felt the want of nothing (except tobacco, an artificial craving), and have no money or trading instincts.

During my stay there, I gave paper and chalks to them, and obtained a number of specimen drawings, for the representation of natural objects is much practised among the Australians, and is one of the lowest intellectual developments; some of the figures are particularly grotesque, but the meaning was generally evident. The accompanying are selected from them. The dugong is curious considering the great distance from the sea of this tribe; it is therefore likely that the dugongs come some way up this, the Adelaide River. Their vocabulary was very small, and they could not count more than five, after that came "many." The people were mostly named after birds and places.

At Roebuck Bay the country was very flat with thin bush, the shore being fringed with mangrove swamps, or sand from the coral reefs, the latter being covered with cockleshells innumerable, which further inland were collected into "middens," and flies were omnipresent, the effects of which on the natives are so well described in Dampier's Voyages; these were even more repulsive than those of the Adelaide River. The men were almost black, with much hair on the face when grown up, rather above the ordinary height, with exceedingly thin legs and small hands; they were extensively scarred and often wore nose sticks, but did not file or remove any of the teeth.

The following are a few measurements I was able to take there:—

	Height.	Length of Head.	Width.	Index.
	ft. in.	ins.	ins.	
No. 1 Man	5 4¾	7 7/16	5 11/16	77
„ 2 „	5 5¾	7 11/16	5 5/16	66
„ 3 „	5 8¾	7 8/16	5 11/16	76
„ 4 „	5 5½	8 1/16	6 8/16	65

Not far away in the bush there was a camp of rather large size, and in it during the day-time many women, children, and dogs, with a few of the old men. There were about twenty rude huts, or shelters of three chief kinds, the first consisted of branches, leaves, grass, or pieces of corrugated iron put up into the forks of small trees, throwing a shifting shade; secondly, collections of old pieces of cloth, canvas, mats, &c., also up in trees or bushes about 3 feet from the ground; thirdly, branches, old canvas, and other refuse more or less supported by artificially placed posts; these were surrounded with wood, ashes, shells (*area granosa*), and rubbish of all kinds. Their clothing was even more scanty than that of the Adelaide River natives, even the women scarcely having a rag on, the men occasionally wearing a pearl shell ground down. When in mourning the women or "lubras" plaster red clay in their hair, which then hangs down in small detached heavy masses, looking most extraordinary; they had scarcely any ornaments, armlets, and sometimes also wearing kangaroos' teeth as charms; the children when very young are carried in hollow wooden trays or cradles about 2 feet long; they are entirely without protection, and seem to be frightfully neglected: it is wonderful how they live at all. The women except when in mourning have the hair quite short. Their weapons were very primitive, being made of wood only, the spears being about 10 feet long, often very crooked, unbarbed, the ends being merely pointed and hardened (these are thrown *without* a "Woomeara") "Boomerangs," or Kileys, of various sizes and shapes, over which they have most perfect control, the very small boys being expert at killing fish, &c.

"Throwing sticks" about 2 feet long are quite straight, heavy, and hard, these they make to spin much like the Boomerangs.

The absence of stone or glass headed or even barbed spears is remarkable, likewise the absence of the Woomeara.

For defence they have thick wooden shields about 2 feet 6 inches wide, the ornamentation being always the same, cut more or less deeply in; the bar for holding them was always much too small for a European hand.

Landing one day in a small harbour on Cape Bougainville, north of the Admiralty Gulf, where natives were fairly numerous, judging by the numbers of fires visible from time to time, I came across a camp only recently left, indeed I believe the natives were hiding in the mangrove swamp behind; the fires had evidently only been out a short time, and around were cockleshells, fruit pods, and several large "Volute" shells used for carrying water, also a smooth rounded quartzite stone for pounding the fruit, &c., 5 inches long and 4 inches thick; leaning up against one of the remarkable Baobab trees (*Adansonia Gregorii*), was a long board, 12 feet by 9 inches wide, and 1 inch thick, with square holes cut near each edge, about 2 inches apart; this I think must have been acquired from a "pearler" and was now being perforated for making a raft (?); there were several of these large Baobab trees at the back of the beach, and others were seen further inland; carved into the bark of one at the back of the camp were a number of figure drawings which I copied; there was one small shelter, a few leaves and some grass heaped up on a shrub, about 3 feet from the ground; no weapons were found in or near it. Soon after I visited a small rocky island in the Admiralty Gulf; it was entirely composed of a fine Quartzose sandstone showing marked horizontal bedding, but much fractured, forming deep clefts and isolated masses; on the coral sand were tracks of turtle and numbers of bones, also many foot-marks of natives, converging to a beaten path, which went to the top (50 feet high), where there seemed to have been a regular factory for making spear-heads, hammers, &c., for among the chips I picked up quite a number of slightly imperfect ones; below there was a tree with grass in it, and under its shade, ashes and Volute shells; but the most interesting evidence of the natives was in small caves, or places where the sand had been excavated from under projecting ledges of the rock; here fires had been, and many people had lain, and on the roof, which was from 2 to 3 feet above the floor, had been worked in red, black, or white pigments various drawings, and among them the representation of a clothed man probably meant for a "pearler."

At Baudin Island a little further north, where a "tide pole" party from the ship had been camped the year before, and where quantities of bottles, tins, old iron, &c., had been left, we found that the natives had left everything complete except the bottles; they were *all* gone, only a few fragments remaining, some

showing distinctly that the natives had been manufacturing spear-heads from them, evidently not understanding the value of iron. At Wyndham (Cambridge Gulf) glass spear-heads are very common. It is curious that the people of Bigge Island when they attacked our boats had none but the ordinary wooden weapons, crooked spears, throwing sticks, &c., of Roebuck Bay, yet a very little further north they were well versed in making stone and glass spear-heads.

During the whole season no canoes of any sort were seen, but near Cape Bougainville, Bigge Island, and Baudin Island rafts were noticed a few times, yet many of the islands are evidently frequently visited for turtle, stone, &c.

My actual opportunities were so few of going on shore that I am able only to offer such a very meagre description of this interesting and comparatively little known part, and regret my inability to do it justice.

The following are words from different places I was able to obtain :—

	Woolwonga.	W. Alligator River.	Roebuck Bay.
One	*And-or-e*	*Min-bar-a*	*Gung-ar-e.*
Two	*Gar-unklal.*	*Goor-at*	*Gung-ar-o.*
Three	*Garung-argaring*	*Goor-at-minbara.*	*Gudit-e.*
Four	*Gar-unklal-argaring*	*Goor-at-Goor-at.*	*Munda.*
Five	*Nabal-argering.*		
Many			*Gor-ing.*
Fire	*Wack*	*Goo-ginock*	*Gunko.*
Water	*Week*	*Garra.*	
Food	*Moy-ah*	*Moyah-gerrit.*	
Tree	*Umbal*		*Bābo.*
Spear	*Boko.*		
Man	*Nul.*		
Woman	*Alomandobu.*		
Boy	*Wor-riba.*		
Girl	*Almaren.*		
Dog	*Ing-ar-e.*		
Kangaroo	*Tur-ning.*		
Iguana	*La-leen.*		
Duck	*Ger-benck.*		
Goose	*Numbul.*		
Turkey	*Bā-bunck.*		
Lake	*Au-lunga*	*Gor-roo-ya.*	
Sleep	*Dongiga*	*Yung.*	
Hot	*Ur-wa-lack*	*Goo-naridock.*	
Cold	*Ur-lul*	*Warro.*	
Large	*Anāgan.*		
Little	*An-wooko.*		
Fish	*Gur-bunck.*		

JAPANESE ONOMATOPES *and the* ORIGIN *of* LANGUAGE. By W. G. ASTON, C.M.G.

THIS paper was suggested by the following passage in Dr. Tylor's "Primitive Culture":—

"The time has now come for a substantial basis to be laid for Generative Philology. A classified collection of words with any strong claim to be self-expressive should be brought together out of the thousand or so of recognised languages and dialects of the world. In such a Dictionary of Sound-words, half the cases cited might very likely be worthless, but it would show on a large scale what particular sounds have manifested their fitness to convey particular ideas by having been repeatedly chosen among different races to convey them."

CHAPTER I.

Phonetic System of Japanese.

The phonetic system of the Japanese language is by no means well adapted for onomatopœia. The older language adheres strictly to the rule that every syllable must consist of a vowel or of a consonant followed by a vowel, as E-no-shi-ma, thus excluding all final consonants, all double consonants, and all combinations of consonants.

Onomatopoetic effects such as we have in scrunch, shock, slap, clap, snap, &c., were therefore impossible. The sounds *p*, *x*, *ng*, *th*, and *l* are wanting in the older Japanese, and there are only five vowel sounds, viz., *a*, *e*, *i*, *o*, and *u*.[1] Certain combinations of consonants and vowels are avoided. *F* is only found before *u*, and *h* before the other vowels. For *si* a Japanese says *shi*; for *ti*, *chi*; for *di* or *zi*, *ji*; for *tu*, *tsu*; and for *du*, *dzu*. *Tsu* and *dzu* are merely the Japanese way of saying *tu* and *du*, and the combination of consonants is therefore more apparent than real. The phonetic resources of the modern language are somewhat more extensive. It admits of double, but not of combined consonants, and it has one final consonant, viz., *n*. The letter *p* has also been revived (the prehistoric language probably had it), partly in imitation of the Chinese, and partly because it was

[1] The Royal Geographical Society's spelling has been followed. Pronounce vowels as in Italian, consonants as in English. As a rule avoid the shut sounds of vowels.

found suitable for onomatopes, to which its use in Japanese words is almost exclusively confined. This is an instance of onomatopœia providing a corrective to the general tendency of phonetic decay.

The modern language supplies most of the examples in the following lists. A good number are taken from a collection kindly lent me by Professor Chamberlain.

Notwithstanding the poverty of its phonetic system, the Japanese language is rich in onomatopes. The popular literature abounds with them, and the speech of the people has many more which rarely find their way into books.

Chapter II.

Words Representing Significant Inarticulate Vocal Sounds.

An onomatope may be defined as the artistic representation of an inarticulate sound or noise by means of an articulate sound.[1] But it will be convenient first to consider a small but important class of onomatopes, if they should be called so, to which this description is not quite applicable, viz., the articulate sounds which represent inarticulate significant human vocal sounds. The English words Oh! no! hush! (in Japanese *O*, *ina*, *na* or *nu*, and *woshi*) may be taken as types of this class of words, for which it could be wished that there were some better general term than Interjection. They come before ordinary onomatopes in the development of human speech, and differ from them, firstly, in being formed from sounds which are already significant, and secondly, because they are not so much imitations as modifications of these sounds by a gradual process. It will be readily seen that they occupy quite a different position in the history of language from onomatopes like bow-wow, cock-a-doodle-doo, rat-tat, &c. The latter, as is obvious from their very nature as articulate and artistic imitations of inarticulate sounds, belong necessarily to a period when a system of articulate sounds had been already established, and considerable progress therefore made in the acquirement of the art of speech. Indeed most of them are of quite recent origin, and bear upon them the distinctive marks, not merely of the language to which they belong, but not infrequently of its most modern form. Whether any were originally inarticulate imitations of non-human sounds, which subsequently received a more articulate character, may be

[1] There is a kindred art, viz., that of the *exact* imitation of animal cries and other sounds, successfully practised by some of our undergraduates and other young people, as well as by tame ravens and parrots. It probably played some part in the development of language, but I can only mention it here.

left an open question. The analogy of the lower animals leads us to infer that mankind occupied themselves for a long time with their own natural cries before taking the trouble to imitate for purposes of expression sounds not of their own making. It is true that the parrot in captivity and under human tuition learns to imitate other cries and sounds than its own, and even occasionally to attach some sort of meaning to them. But a natural progress even as far as this very limited degree of development is quite another thing, and marks a much more advanced condition of intelligence.

It would appear, therefore, that while onomatopœia in the ordinary sense of the word may and does explain the origin of a vast number of individual words, it can throw little or no light on the problem of the origin of the art of speech. How did mankind from expressing a few simple ideas only by a few inarticulate sounds become able to express many and complicated ideas by a variety of articulate sounds? Put in this way, the question suggests its own answer, viz., that it must have been by the simultaneous differentiation of the ideas on the one hand and of the sounds on the other. But such general formulæ have little value, when unaccompanied by some evidence of the manner in which this development took place. Before enquiring, however, whether any traces of such a process are to be found in the Japanese language, which from its more transparent nature as an agglutinative tongue may be presumed to afford greater facilities for such an examination, let me draw attention for a moment to the significant natural cries which form as it were the raw material of this process. We have them still with us, as certain merits of their own have prevented them from being altogether superseded by more conventional modes of expression. Proof is afforded of their primitive character by the fact that they are everywhere almost[1] identical.

The natural cry should not be confounded, as is sometimes done, with the articulate word which is its outcome. The cry **oh**! extorted from us by pain or fright differs sensibly from the **oh**! of polite conversation. The latter may seem the simplest of sounds, and it may be difficult to conceive of a time when it formed no part of the human vocabulary. Many would affirm that it is a mere natural utterance with nothing conventional or artificial about it. Yet we shall find that in order to say oh! we must, firstly, compress the lungs by means of the muscles of the abdominal wall and the internal intercostals and triangularis sterni in the chest—secondly, the vocal chords must be rendered tense by the crico-thyroid muscles, thirdly—— But I will spare

[1] The bifurcation of human language may be traced even in these non-articulate utterances. Cocks of different breeds do not crow alike.

this Institute the enumeration of the muscles required to bring the vocal chords into the proper position for vibration, to lower the jaw, to draw down the tongue into the floor of the mouth where it will be out of the way, to part and protrude the lips, and to close the passage of the nose. Suffice it to say, on the authority of one of our most eminent anatomists, that this simple-seeming oh! requires for its production the combined action in an instant of time of about forty muscles. The steps in this complicated process as far as lowering the jaw (inclusive) are necessary to produce even an inarticulate oh! To the pre-articulate man the others must have been unknown or practised by him in a meaningless hap-hazard fashion. He had not learnt to differentiate his utterances so elaborately. Even the civilised man from negligence or under excitement readily omits some or all of these precautions and reverts in a greater or less degree to the natural unsophisticated cry. But for the civilised articulate oh! of ordinary speech they are all indispensable. It is obvious that no one person could have invented all these contrivances and imposed them on his fellow men. They must have been introduced one after another at various times and in many independent quarters. Mankind in general adopted them gradually by a process which must have extended over hundreds of generations, and is not quite complete at the present day. This is a totally different thing from the formation of a word like cock-a-doodle-doo, which is as much a work of individual genius as Hamlet or the Laocoön. The result, however, is the same, viz., the substitution of an articulate for an inarticulate sound.

These natural cries were perhaps originally not significant. But it is unnecessary here to carry further back an examination which may better be left to the enquirer who will continue the work begun by Darwin in his "Expression of the Emotions."

Natural cries may be classified as follows:—1st, Shouts and shrieks; 2nd, Grunts; and 3rd, Hisses. This division corresponds in a general way to the vowels, nasals, and aspirates of more articulate speech.

Shouts comprise all inarticulate sounds made with the mouth freely open; in grunts, the sound comes through the nose, the mouth being closed or nearly so; in hisses, the aid of the vocal chords is dispensed with, and the passage of the mouth much contracted.

Shouts and Shrieks.

In Japanese, shouts are represented chiefly by the interjections *a* and *o* as in so many other languages; shrieks by *i*. Shouts differ from grunts and hisses in being audible to a much

greater distance, a circumstance which greatly enhances their importance.

The first differentiation of the shout was by means of variations of tone, which are still essential in this class of words. It matters little whether you say oh! ah! or aw! if you only give the right intonation.

The principal words of this kind in Japanese are—

A or *ā* ... . An exclamation of pain, grief, or admiration, corresponding to our Ah! It is the base of the interjections *ana*, of surprise or grief, *aware*, of pity, *appare*, of admiration, and *aita*, of pain. The last, however, is a combination of *a* with the root of the conventional word *itaki*, painful.

Aara .... In a modern poem this word occurs as an onomatope for a dying groan.

Wa .... After a word *A* becomes *Wa*, in order to avoid a hiatus, which is as objectionable in Japanese as in other languages. It has a purely exclamatory force in *Ara!* for *Are wa*, that, *Kora*, for *Kore wa*, this, taunting phrases something like "there you go!" Its more usual force, however, is that described by a native grammarian as follows, "*Wa* has somewhat of an exclamatory force and is a particle which possesses the meaning as it were of choosing out and separating a thing or an action from among a number." As a distinctive or separating particle it is very frequently used to mark out the subject of a sentence, and has therefore been taken by some writers for the sign of the nominative case. It is not really so, however, as it is joined to other cases as well. It would be more correct to describe it as an imperfectly developed case sign.

After verbs *Wa* usually assumes the form *ba*, and it then becomes the sign of the conditional mood.

Wā or *wā-wā*[1] .... A clamorous shout. Hence *wameku* ([2]O.L.), to clamour, to shout. Cf. French brouhaha.

Ya .... This word varies in meaning from an exclamatory to an interrogative particle. In the latter capacity it takes a place in the grammatical system of the language.

Ya is sometimes a mark of the vocative case, and it also

[1] The functions of reduplication are very restricted in Japanese grammar. It has been stated that the plural of nouns is formed in this way. But this is not quite correct. It is true that the pronoun *ware* has such a plural and a very few nouns are reduplicated with the same meaning as is given by our prefixing the word "every," or "some," in English, as *Kuni-guni*, every country; *hito-bito*, everybody; *toki-doki*, sometimes. Some verbs have their roots reduplicated, as *tataku*, to beat; *sosogu*, to rinse; *mamoru*, to watch; *tattobu*, to honour; *tsutsuku*, to tap; probably with the original intention of indicating repetition, continuance, or intensity. As a general rule in Japanese, there is reason to suspect onomatopœia wherever we find reduplication, which is itself an onomatopoetic procedure.

[2] O.L. These initials mark words which have been received into the ordinary language, and are no longer regarded as mere onomatopes.

forms, along with the *ba* of the conditional mood above referred to, an optative termination. Thus *tori-kaye ba-ya* means "oh that I could exchange!"

The Corean[1] language has also an interrogative *ya*. From *ya* are derived *aya*, *iya*, *uya*, and *oya*.

Aya .... An exclamation of wonder. Hence *aya-shiki* (O.L.), strange, wonderful, *ayashimu*, to despise.

Iya .... An exclamation of regret or (usually unpleasant) surprise.

Yā, *yai*, an exclamation of horror, should probably be placed here.

Uya-uya .... Respectfully, generally met with in the derivative adjective form, *uya-uyashiki*, respectful, reverential, and the verb *uyamāu*, to respect, to venerate.

Oya or *oya-oya* An exclamation of mild surprise like our "dear me!", commonly used by women at the present day.

O or *wo* .... An exclamation of surprise or admiration, like our oh! It is *o* before and *wo* after a word, in obedience to the necessities of the Japanese phonetic system.

From the *O!* of admiration comes *oho*, root of *ohoki*, great, and from the latter the honorific particle *o*. There is a curious example of a similar transition of ideas in the Chinese character 大, great, which is said to be the representation of a man, 人, holding up his hands in an admiring posture. Our own honorific Mr. is also traceable to a word meaning great.

A long *ō* having the meaning great, a short *ŏ* came to mean small, as in Obama, "little shore," the name of a place.

The Japanese verb has no grammatical forms to mark person. But as *o* and the other honorifics are almost always associated with the second, rarely with the third, and never with the first person, they afford a useful indication of the person of the verb, and may be regarded as the germs of what in a later stage of development might become true grammatical forms.

Wo .... (After a noun). Originally a mere exclamation, *wo* becomes first a particle slightly emphasizing the word which precedes, and secondly, the sign of the objective case.[2] It is also used with verbs as an adversative particle having somewhat the same face as our "but," "whereas."

Yo .... An exclamation of entreaty something like "do, please." After a noun it forms a sort of vocative case and with verbs of the second and third conjugations, it is the sign of the imperative mood.

[1] Corean is a distant relation of Japanese. The grammatical structure of the two languages is almost identical, but there is proportionately a strange paucity of common roots. Some deny that there are any.

[2] See my grammar of the Japanese written language, page 124.

There are in Japanese numerous exclamations indicating assent or, like the sailor's "Aye, aye, sir," comprehension or obedience to an order. These fluctuate between different vowels. Thus we have *oï*, *aï*, and *aüh* (familiar), and *he* and *hai*,[1] which are more respectful. *O*, *e*, and *a* are also used for the same purpose. In short the only vowel not used as an affirmation is *i*.

Oi .... A shout, calling to a person at a distance, like our "halloa!" Cf. Greek ἄνω, to shout.
Nō-nō .... Ditto.

The history of the vowel *i* presents greater difficulties. It does not stand by itself as an exclamation, nor is there the same consensus of other languages in regard to it which is so conspicuous in the case of *a* and *o*. But it may perhaps be recognised in combination with other elements in the initial vowels of the words *ina*, "no," *iza*, "no," *iya*, an exclamation of surprise (generally unpleasant), *iya-iya*, a mother's cry of warning to her baby, and *imu* (O.L.), to avoid. From *iya* are derived *iyana*, nasty, *iyagaru* (O.L), to dislike, *iyashiki* (O.L.), base, mean, and *iyashimeru* (O.L.), to despise. The natural cry to which this *i* corresponds seems to be the shrill note of warning observable in many gregarious animals and not extinct even in man. There is a marked preference in several languages for the vowel *i* in the onomatopoetic representation of shrieks and other high-pitched sounds. In English we have shriek, screech, scream, squeal, squeak, shrill, chirp, creak, peewit; in Greek there is λιγὺς shrill, and in Japanese *ki-ki*, for a shriek, *kishi-meku* (O.L.), for to creak, *kiri-kiri*, a creaking sound, *kirigirisu* (O.L.), the name of a kind of grasshopper, *pin*, the sound of a slender (treble) string, *pon*, being given as the sound of the thick (or bass) string, *piu*, the sound of a railway whistle, and *chiu*, the chirping of sparrows, or the squeaking of rats.

The fact that the exclamation *ya* passes into an interrogative particle lends some faint colour of probability to the suggestion that it may be the same *i* which pervades the interrogative words *itsu*, when; *idzure*, which; *iku*, how many; *ikaga*, how; and *ikahodo*, how much.

[1] *Hai*, *hai*, *hai*, repeated at intervals of a second or two, is also the Japanese horse boy's cry of warning to his beast. The right tone is essential here. It may be mentioned that the Corean muleteer's, pack horse man's or bullock driver's call to his animal, which sounds to the stranger like a prolonged inarticulate *Yaw!* is in reality *iri oō*, *i.e.*, come hither. *Oö* is a polite form of the imperative, as we say "sir" to a dog.

E or *Ē*.[1] .... An exclamation of grief, repentance, anger, dislike, etc., also, though in a different tone, a query like our Eh? This exclamation is perhaps a variant of the *i* just described.

Hē .... (Rising accent.) An exclamation of surprise and admiration.

Grunts.

The grunt is the easiest of all vocal utterances. It is the sound made by the vibration of the vocal chords in the normal condition of the organs of speech, *i.e.*, with the passage of the nose open (as it usually is to allow of breathing), and the mouth shut or the lips only slightly parted. It is no doubt this ease and simplicity of pronunciation which has made the grunt so tenacious of life throughout the long ages of human history. When a man says "h'm," instead of "yes," the reason is simply an indolent reluctance to take the trouble of opening his mouth, closing the nostrils and making the necessary movements of his tongue and lips.

The first attempt to differentiate this sound was not in the direction of making it articulate, *i.e.*, by converting it into *n*, *m*, or *ng*. Variety was produced by differences of tone and emphasis and by reduplication. In this way several distinct sounds arose each with its appropriate meaning. I shall confine myself here to two of these—the grunt of assent, in a low note, and the grunt of dissent on a higher key. The first of these we render in English by "h'm," often doubled for greater emphasis. It may be traced to an earlier stage of development in the low murmur of animal satisfaction which some human beings and dogs, and, with a difference, all cats utter when caressed. The "hum" by which our ancestors showed their approval of a good sermon, is obviously a near relation of this sound. The grunt of dissent, on the other hand, had probably its origin in the snort or growl of displeasure common to man with some of the lower animals.

The grunt of assent is represented in Japanese by *u* or *un*. From this, according to a native etymologist, are formed the words *u-be* (O.L.), "Right! good!" and *ubenaü* (O.L.), a regularly inflected verb meaning "to give assent."

I have elsewhere[2] attempted to show that the Japanese language had once a verb *nu* (root *n*), "to be" (the copula, not the substantive verb), now superseded by its derivative *naru*, but not without leaving traces in the Japanese grammatical system. *No*, the partitive or genitive particle is simply another form of this *nu*, the Japanese language affording frequent

[1] The vowel *e* I take to be a more recent development than *a*, *o*, or *i*.
[2] In my grammar of the Japanese written language, 2nd Ed.

examples of the exchange of *no* for *nu*. *Ni*, the locative particle, is also derived from it. I now suggest that this verb *nu* is the grunt of assent become articulate, and that it is very possibly the same element which in the form *u* is the characteristic termination of the indicative or affirmative form of the verb. The vocalization of *n* into *u* is a familiar feature of Japanese etymology.

The grunt of dissent is the parent of words of negation in a large number of languages.[1] In Japanese we have *ina*, no, and *inamu*, to refuse, which form a parallel to the *ube*, right, and *ubenaü*, to assent, quoted above. The negative adjective is *naki*, not being, and the negative termination of verbs *nu* or *anu*. Thus *naku* is to weep; *nakanu*, not to weep; *taberu*, to eat; *tabenu*, not to eat. *Na* is the negative imperative particle prefixed or suffixed to verbs.

The modern Japanese word for no is *ïye*, but as this has little apparent expressive quality, the English word no, generally reduplicated, has become a great favourite with the Japanese. Along with "Hear! hear!" it is frequently heard in the Japanese Diet. The Corean word for no, not, is *ani*.

There is a negative future or potential termination *majiki* (*mai* in the modern colloquial), of which *ma* is the essential part. This I am inclined to regard as a variant of the above. Cf. Corean *mot*, "cannot, may not"; *malta*, "to be unable to do," "to be prevented," "not to do." This word is often used in the Imperative, viz., *malla*, "don't." Cf. also the Greek μή.

There is a modern colloquial interjection *mā*, which is sometimes a cry of remonstrance or deprecation, but is used in so many different ways that it is impossible to say what its proper meaning is.

I may note here, though, as ordinary onomatopes, they properly belong to the next chapter, the verb *naru*, "to sound," the noun *ne*, "a sound" (especially a musical sound), *naku*, "to sing" (of a bird), or "to weep" (of human beings), *unaru*, "to groan," "to moan," "to make a long reverberating murmur like a bell when struck"; and *udaku*, "to roar" (of a wild boar).

Hisses.

The hiss is produced by sending the breath forcibly through the mouth, which is greatly contracted at some part. The vocal chords are silent, and there is therefore no differentiation by means of tone as in the case of the shout, shriek, and grunt.

The hiss is usually represented in articulate language by *s* or *sh*, although instances are not wanting of the use of other

[1] See Tylor's "Primitive Culture," 3rd Ed., vol. i, page 123.

aspirates for this purpose. The original inarticulate sound is employed for "hissing" on a dog (in French, *Kss*), or for driving off fowls (for which Tennyson gives the curious provincial variant "*Pluksh*"). It is also used for ordering silence, being in this case at first perhaps a mere noise to drown the voice of an unwelcome speaker.

To the first of these cries we should probably refer the Japanese interjection *sa*, *sā*, or *iza*, used like our "Come! get on!" in urging one to do something. From this are derived *izanąu*, "to invite," *sasöu*, "to incite," and also perhaps *susumeru*, "to encourage," and *shiuru*, "to compel." The Corean interjection corresponding to *sa* is *ösö*. The Greek *σένω* had no doubt its origin in a cry of this kind.

I would now suggest, with some diffidence, that the verb *suru* (root *s* or *sh*), "to do," and the distinctive terminations of Causative and Transitive verbs which contain this element, are to be referred to the same source. As examples of these verbs I may instance *miseru*, "to show," from *miru*, "to see," *kasu*, "to lend," from *karu*, "to borrow," *korosaseru*, "to cause to kill," from *korosu*, "to kill."

I may here relate a personal anecdote which illustrates the change of an inarticulate hissing sound into an articulate *f*, and other onomatopoetic matters. Some years ago it was my fortune to fall under the dominion of a domestic tyrant, aged two, for whom it became my task to provide amusement. I one day took her up under the arms and swung her round me, making as I did so, almost unconsciously to myself, a hissing sound which had no doubt been familiar to me in my childhood, and which was probably meant to convey the idea of something whizzing through the air at a great rate. The little thing was mightily pleased and when put down, said promptly, "Do it again." "Do what again?" replied I. She at once answered, "Do *f-f-f* again," the sound here represented by *f-f-f* being neither the hissing sound I had made, nor an articulate *f*, but something between the two. The next time, however, it developed into a wholly articulate "*iff*," which after a few minutes became obsolete, my liege lady having chosen to discontinue it in favour of a new acquisition, the more conventional word "swing."

The sibilant sound enjoining silence, from which comes our English "hush," is rendered in Japanese by *woshi*, *oshi*, or *shidzu*, with the last of which may be compared the French "chut" and the Greek *σιζω*. From *shidzu* are derived *shidzu-shidzu*, quietly, *shidzukani* (O.L.), do., *shidzumaru*, to become quiet, to settle down, and *shidzumu*, to sink. The same *shidzu*, by an easy transition, signifies respect. Thus I find in a narrative of

the Christian rebellion of Amakusa in the seventeenth century that the Christians honoured one of their leaders by bowing their heads and uttering the sound *shidzu-shidzu*.

The modern Japanese onomatopoetic rendering of a hiss is *shiu*.

This is perhaps the place to mention the interjection *sha!* of contemptuous surprise—like our *Pshaw!*

CHAPTER III.

Imitations of Non-Significant Human Vocal Sounds.

It seems probable that this class of words comes next[1] in order of development after the representatives of significant inarticulate sounds, and that the invention of mute consonants was associated with this stage in the progress of the onomatopoetic art. They are absent from words of the preceding class, and it is unlikely that they were first used for the imitations of noises and non-human sounds where anything at all resembling a mute consonant is extremely rare, being only met with, and then but approximately, in the cries of a few birds. In the case of the non-significant human vocal sounds, however, such as blowing (for the labials), spitting (for the tip-of-tongue sounds), gulping (for the root-of-tongue sounds), and coughing (for the glottis mutes, and indirectly for the root-of-tongue sounds), the model was at hand, and I have little doubt that it was in the imitation of these and similar sounds that the mute consonants had their origin. As the Chinese Book of Odes has it:—

> "In hewing an axe-handle,
> In hewing an axe-handle,
> The pattern is not far off."

It is probable, however, that these sounds were made in sport before they were applied to any practical purpose.

At this point we meet for the first time with a new element of onomatopœia, viz., the imitation of motions by motions of the organs of speech. Onomatopes, like other words, have two aspects. They are not only sounds, but motions of the organs of speech. As sounds, they are cognizable by the sense of hearing both of the speaker and of the hearer; as motions they

[1] By the division of language into four stages, viz. (1), Natural Cries; (2) Interjections; (3) Imitations of non-significant human vocal sounds; and (4) Imitations of other sounds, it is not meant that all the words constituting each of these classes were formed in this order, only that *some* Interjections were the first words to come into use; next, *some* imitations of human non-significant vocal sounds of which the words in the list at the end of this chapter are modern representatives, rather than specimens, and next, *some* imitations of other sounds. The corresponding progress from vowels, nasals, and aspirates (in this order?) to mute consonants must be understood with a similar qualification.

are perceptible by the sense of touch (including the muscular sense) of the speaker in the first place, and, indirectly, of the hearer also, by means of the associations of touch excited by the impressions which come to him through the ear. In the case of labials, and to a less extent of other consonants, the sense of sight of the person addressed is also appealed to. This element of onomatopœia has not received the attention which its great importance demands.

It may be useful to take here a short survey of the principal consonants in their aspect as motions of the organs of speech, and for greater convenience I append a table in which the letters of the Japanese language are distinguished by being put in italics.

	Labials.	Tip-of-tongue sounds. (Dentals.)	Flat-of-tongue sounds. (Palatals.)	Root-of-tongue sounds. (Gutturals.)	Glottis sounds.
Hard Mutes ..	*p*	*t*	*ch*	*k*	Sound of coughing.
Soft Mutes ..	*b*	*d*	*j*	*g*	Sound of clearing the throat gently.
Hard Aspirates	wh, *f h*	*s*	*sh*	χ	*h*.
Soft Aspirates	*w*, v	*z*	j (French)	g, as in German lager	Spiritus lenis.
Nasals	*m*	*n*	ñ	ng	None.

The glottis mute is found in Arabic, but in no other language, in so far as I am aware.[1]

R and *L* are tip-of-tongue letters, but they present peculiarities which make it proper to omit them from the above table.

[1] The terms dental, palatal and guttural are objectionable, as they refer to parts of the mouth which are wholly passive in the act of pronunciation, and their use therefore tends to divert the attention from the far more important functions of the active organs of speech.

The vowels have hardly any importance as expressive of motions, and the nasals almost as little. The aspirates with *r* and *l* may stand for motions as well as sounds, but the principal mode of expressing motion is by means of the mutes. Indeed, the latter are hardly ever used to represent sounds except for the imitation of certain animal cries in which we indulgently recognise an approach to articulate speech, and in some of the class of words described in the heading of this chapter.

The labials are naturally adapted for expressing motions in which the lips take part, such as blowing, spitting, pouting, spewing, or making a "moue." They are also fitted to represent such ideas as can be expressed by puffing out the lips and cheek, as bulge, burst, bubble, bulb, bulk, ball, &c.

The tip of the tongue is the smallest and most mobile of the organs of speech, and is therefore best adapted for representing nimble, agile, or delicate movements of small, easily moved objects. The tip is in this respect a contrast to the root of the tongue. But the lips are almost as mobile. Words expressive of pointed things or their motions often contain a tip-of-tongue sound.

The flat-of-tongue, *i.e.*, the forepart of the tongue pressed flat against the palate, is used in one or two Japanese onomatopes to express closeness or stickiness. (See below.)

R and *l*, like the other tip-of-tongue sounds, are easy of pronunciation, but they have a special onomatopoetic character as indicating continued tremulous motion.

There is no *l* in Japanese, and no *r* in Chinese. Coreans pronounce the same letter *l* or *r* according to its place in the word. This would seem to indicate that the distinction between *r* and *l* is of recent origin.

The chief characteristic of the root of the tongue as an organ of speech is its comparatively greater bulkiness, as compared with the lips and tip-of-tongue. It is therefore associated with ideas of weight, bigness, power, &c., also of clumsiness or awkwardness. It is the dislike of the trouble of putting such a large mass of muscle in motion that has gained for gutturals their bad name as a dysphonious class of sounds. That this irksomeness has a very real influence on speech is shown by the phenomenon presented by languages wholly unconnected with each other, of the gradual working forward of root-of-tongue sounds till they become flat-of-tongue, or even tip-of-tongue, sounds. Cf. Latin, *carus*, French, *cher*, Latin, *Cicero*, English pronunciation *Sissero*, German *Karl*, English, *Charles*, French, *Charles*, Chinese Peking, modern mandarin dialect Peching, *Loochooan hachi-machi*, for Japanese *hachi-maki*. Even the English *k* and *g* have slipped forward somewhat from the deeper sounds of these letters still heard in Scotland.

The root-of-tongue onomatopes also express motions in which that organ or the adjoining parts are concerned.

The onomatopoetic bearing of the classification into mutes, aspirates and nasals need not detain us long. In the hard mutes, the motion of the organs of speech begins or ends abruptly in a short, sharp shock, whereas in the soft mutes the beginning or end is slower, heavier, and less abrupt.

A final nasal is suitable for expressing motions which gradually die away, as swing, spring, &c. But these last named consonants greatly resemble vowels and are more often met with as onomatopes of sound.

The aspirates, in which the mouth is greatly contracted and which have not the vibration of the vocal chords to swell their sound as is the case with the nasals and vowels, require a comparatively greater effort to make them continuously audible. This sense of effort is utilized onomatopoetically in such words as stout, strong, stiff, shove, push, strain, stress, stamp, stubborn, spring, smash, shock, shatter, thud, thrust, thump, &c., to express effort, violence, or force. Compare also the Greek ἄσθμα, panting for breath, from ἄω, to breathe.

When with the effort required for the aspirate there is combined that necessary to put the comparatively unwieldy root-of-tongue in motion, as is the case in pronouncing χ, most languages refuse altogether to admit such a sound to their phonetic repertory. The Latin tongues are notoriously averse to it, and it is also absent from Japanese, Chinese, and Corean. Our own language, which had it not very long ago, eventually discarded it as quite too troublesome. But for the very reason of its difficulty its expressive force is undeniable, as we may see by comparing the German ach! and the Irish och! with our feeble and colourless ah! and oh! And the onomatopoetic fitness of such words as the Greek ἄχος, grief, ache, and μόχθος, labour, a burden, will not be disputed.[1]

It may contribute to a clearer apprehension of the nature of the mutual relations of the elements of sound and motion in onomatopes if we examine as closely as may be the familiar English words *rap*, *rat-tat* and *knock*. All are unmistakably expressive, and they have all a strong resemblance to each other. In what does their expressive quality consist? Mainly, I should say, in the quality and length of the vowel sounds. Substitute for *a* and *o* any other vowel sounds, and it will be found that most of the onomatopoetic effect is lost. *Roop*, *root-toot*, and *knook* would

[1] It would take me too far from the present subject to show that much of the so-called euphony of language is in reality the convenience of motion of the organs of speech, and that melody of verse is largely a harmonious dance of the same organs with a charm quite independent of the accompanying sound.

not answer the same purpose, nor would *rip*, *rit-tit*, or *knick* do, though the last has an onomatopoetic value of its own, as may be seen by Goethe's lines—

> "Wir knicken und ersticken
> Doch gleich, wenn einer sticht."

Even the same vowels if lengthened out as in the French words *râpe*, *rate*, or in *knaulk* for *knock*, will lose most of their expressive quality. On the other hand, the short, shut sound of *a* or *o* might be put alone unsupported by any final consonant without wholly marring the effect.

The Japanese language has to content itself with open syllables for similar onomatopes as in *ta-ta-ku*, to rap, to knock.

So much for the vowels. The final consonants, it will be observed, are all hard mutes, one being a labial, one a tip-of-tongue sound, and one a root-of-tongue sound, the onomatopoetic effect being almost the same in each, thus showing that it depends more on the quality of the sounds as hard mutes than on the organs of speech with which they are produced. It appears to me that the function of the hard mutes is here two-fold. They make it easier to give the vowels the requisite short, sharp sounds, and the abruptly ending movement of the organs of speech in pronouncing them expresses the abrupt termination of the motion which produces the rap, rat-tat, or knock. They can hardly be expressive of sound, for there is no *p*, *t*, or *k* in the sound represented. If we try to imitate it exactly, a dull *u* sound will be the result, for which we substitute the more articulate *ŭ* or *ŏ*. For choice, I should say that the final *t* (in rat-tat) produced the best onomatopoetic effect, not on account of its sound, but because the motion of the tip of the tongue in pronouncing *t* is more like that of the knocker of a door than that of either the root of the tongue or the lips in pronouncing *k* or *p*.

The office of the initial consonants is not so clear. *R* may be intended to convey the idea of the continuous motion which precedes the final shock, while the initial *k* of knock, which we now reject in pronunciation, may be the remains of a reduplication.

Everybody has felt the onomatopoetic propriety of the words invented by Swift in "Gulliver's Travels" for his kingdoms of giants and pigmies. As sounds they have no more resemblance to the things indicated than the colour scarlet has to the sound of a trumpet, but if we consider them as onomatopes of motion we shall find some clue to their expressive quality in the preponderance of root-of-tongue sounds and soft mutes in Brobdingnag and in the total exclusion of these elements from Lilliput, which is composed of tip-of-tongue sounds (with one

labial) and hard mutes. Perhaps Swift had also in view the remote resemblance to the words big and little—themselves not without onomatopoetic quality.

The onomatopoetic effect of the well known line,

Quadrupedante putrem sonitu quatit ungula campum,

is due, first to the number of dactyles, which are equally expressive of sound and motion, and secondly, to the large number of hard mutes adapted to express the motion of the numerous sharp blows of the horses' hoofs on the ground. There are here eleven hard mutes—the ordinary Virgilian line averaging half this number—and there are only two soft mutes. Tip-of-tongue letters are also in the majority. Thirdly, the sound is rendered by six nasals, the usual average of these sounds, in a line, being a little less than four. The choice of vowels has probably also contributed to the effect. The first two of these procedures are used by Tennyson in his "Northern Farmer,"

"Dosn't thou 'ear my 'erse's legs as they canters awaäy,
Proputty-proputty-proputty—that's what I 'ears 'em saäy."

Here the shut vowels express the sound.

Swinburne, on the other hand, characteristically gives prominence to the resonant quality of the nasals, combined with the cantering rhythm of the dactyle, in his "Hesperia,"

". . . . . the music, as eight hoofs trample and thunder,
Rings in the ear. . . . . "

Although the Japanese language in its modern form is not unacquainted with such sounds as *mp*, *nd*, and *ng*, they are not used for onomatopoetic purposes, and the Japanese poet, if he would avoid the imputation of writing doggerel, must deny himself the use of all words containing combinations of consonants and adhere strictly to the rule that every syllable must have not more than one consonant and must end with a vowel. The result of this restriction is visible in the following lines of an ancient Japanese poet, where, to express the sound of a horse's hoofs, we find—

Uma no oto no
horse of sound

To-to tomo sureba—
onomatope even when it makes.

That is, "whenever there is the sound of a horse going 'trot-trot.'"

There is a wide difference between this naive repetition of the syllable *to* (*t* for motion and *o* for sound) and the highly elaborate and artistic workmanship of Virgil. *To-to* is clearly not the canter, but some other pace—perhaps a trot.

It is now possible to formulate the rule of letter-changes in the onomatopoetic elements of like words in the same or different languages. As already pointed out by Dr. Tylor, the principle of ordinary Philology which leads us to look for correspondences between sounds produced by the same organ rather than between sounds of the same quality is by no means universally applicable to them. On the contrary, the general rule for onomatopes is that mutes correspond with mutes, aspirates with aspirates, and nasals with nasals, for the obvious reason that in so far as resemblances of sound and quality of motion go, *p*, *t*, and *k*, *f*, *s*, and *χ*, *m*, *n*, and *ng* are more alike than *p*, *f*, and *m*, *t*, *s*, and *n*, *k*, *χ*, and *ng*. Or we may put it in this way—the correspondences follow the upright and not the horizontal columns of the above table.

The only exception to this rule is where the onomatopœia consists in the imitation of, or is in some way connected with, the motion of a particular organ of speech. In this case the variations will naturally be within the limits of sounds produced by that organ, as may be seen by comparing the English spit with the Japanese *betsu-betsu*, both of which are imitations of the motions of the lips and tongue in spitting.

This sounds very simple, but in practice complications arise owing to the peculiarities of the phonetic systems of individual languages, the presence in onomatopes of conventional elements, and, in the case of words which have been received into ordinary language, the action of the usual laws of letter-change.

Examples.

Labials.

Fŭ-fŭ .... The gesture and sound of blowing.

From this are derived the words of the ordinary language *fuku* "to blow," *fuye* "a flute," *fukureru* "to be puffed out," "swollen," *fufumu* "to swell," as a bud, *fukuro* "a bag," *fukumu* "to contain," *futoki* "big," "thick." Cf. Corean *puta* "to blow," *param* "wind," and words with initial labials for blowing and wind in many languages.

The onomatopes for the sounds of wind instruments given below also belong to this group.

Fū .... The motion (and sound?) of expelling from the mouth an ill-smelling odour—equal to our Faugh, Bah, Pah.

Peppe .... Ditto.

Hi (O.L.) .... Fire.

The words for fire have in many languages a labial, probably in imitation of the gesture of blowing a fire. It will be remembered that the Japanese *h* is a labial. The Corean for fire is *pul* (*puta* "to blow"), Malay *api*, Aino *abe*, Greek πῦρ, &c. The Latin *flare* and *flamma* are probably connected with each other, and the English blast and blaze.

Hiru (O.L.) .... To sneeze, also = Latin *pedere*, with the noun *he* (Fr. *pet*) are also to be referred to this group of words.
Apu-apu .... Gasping for breath, as of a drowning man.
Butsŭ-butsŭ .... An angry murmur.
Butsŭ-kusa .... Muttering, grumbling.
Guzu-guzu .... Ditto.
Muji-muji .... Mumbling.
Bera-bera .... Mumbling as in a strange language. Cf. Barbarian.
Becha-becha .... Chattering, gabbling.
Domoru (O.L.) ... To stammer.
Damaru (O.L.) .... To be silent.
Shaberu (O.L.) .... To gabble.

Tip-of-tongue sounds.

Betsŭ-betsŭ .... Motion (and sound ?) of spitting.
Petsŭ-petsŭ .... Ditto.
Atsŭ-atsŭ .... Ditto.
Tsuba (O.L.) .... Spittle.

The first two of these words combine a labial with a tip-of-tongue sound like the English spit, and the Greek πτύω. The *ŭ* in the Japanese words is almost inaudible.

At-to .... Cry of pain. *To* is an adverbial suffix equal to the English "with a," as *pon-to*, "with a bang."
Hot-to .... Cry of relief, of the same force as the French Ouf!
Ot-to .... Ditto.
Not-to .... A sigh (?)

It is however rather by their quality of hard mutes to indicate the quick catching of the breath, than of tip-of-tongue sounds that the *t*'s in the above four words are expressive.

Root-of-tongue sounds.

Gubi-gubi .... Motion of swallowing, motion in the throat at the sight of something good to eat or drink.
Gubi-tsuku (O.L.) To twitch (of the throat) from thirst.
Compare with these words the English gobble, gulp, and the French gober.
Kuŭ, O.L. (*Kufu* *Kupu*) .... } To eat, to bite, should probably come in here.
Ka-ka .... Sound (?) of drinking water.
Gatsŭ-gatsŭ .... Crunching sound while eating.
Gari-gari .... Sound or motion of eating.
Gori-gori .... Eating something hard, hardness.
Mugu-mugu .... Eating. Cf. Corean *mŏk-ta*, to eat.
Gara-gara .... Loud, harsh laughter.

Gukku ....
Gutsŭ-gutsŭ ....
Kutsŭ-kutsŭ ....
Gera-gera .... } Suppressed laughter, giggling. The root-of-tongue sound is chosen as best fitted to represent the motion of suppressing laughter by closing the throat.

Wera-wera .... Joyous laughter.

Waraü (O.L.) .... To laugh. Cf. Greek γελάω.

Ge-e-i .... Yawning. Cf. German gähnen, English gape, gasp.

There is no actual *g* sound accompanying a yawn, but the mouth is thrown open in such a way that no other sound is possible.

Kon-kon-kou .... Coughing. *K* represents both sound and motion.

Haku (O.L.) .... To vomit. Cf. English puke.

The element of motion predominates in this word. Cf. Jap. *aki*, disgust, Greek κόρος, satiety, German ekel, disgust.

Hakŭsho .... Sneezing.

Kushami (O.L.) .... A sneeze.

Shakuri (O.L.) .... A hiccough.

Aspirates.

(*Sibilants.*)

Uso .... Whistling.

Koso-koso .... Whispering.

Kossori .... Secretly, stealthily.

Sasa-sasa .... Whispering.

Sasa yaku (O.L.) To whisper. Cf. Latin susurrare, Fr. chuchoter.

Suü (O.L.) .... To suck. Cf. Latin sugere.

Suya-suya .... Gentle breathing.

Sū-sū .... Breathing.

Hā-sū .... Heavy breathing.

Zei-zei ....
Zeri-zeri .... } Wheezing.

Un-su .... Groaning.

Nasals.

Fum-pun or *Pun-pun* .... } Of strong odours, good or bad. The nasals seem here to indicate the part taken by the nose in snuffing up the odours.

Vowels.

In the following words the vowel sounds seem more important than the consonants.

Hogyā-hogyā .... A child's squalling.

Hogĭ-hogĭ .... Ditto.

Kui-kui ... . Crying or whining from pain.

Ki-ki .... Sound of screaming.

Gami-gami .... Scolding or yelping.

Ā-ā .... Yawning.

The motion as well as the sound is appropriate to a wide open mouth.

Gō-gō .... Snoring. Also a rumbling as of the bowels.
Gū-gū .... Ditto.
Ha-ha .... Laughing.
Ho-ho .... Ditto.

The *h* was evidently never *p* in these words.

Chapter IV.

Imitations of Animal Cries.

Bekkakō .... The crowing of a cock. English *Cock-a-doodle-doo*, provincial *Cock-a-leary-low*, French *Coquerico*, German *Kikeriki*, Spanish *Quiquiriqui* Yoruba *Koklo*, Zulu *Kuku*, Finnish *Kukko*, &c.[1]

There is much in these words that is merely conventional The number of syllables varies greatly and also the choice of vowels and consonants. The points of resemblance are the rhythm, the long open vowel at the close, and the predominance of a *k* sound. It may be questioned however, whether the crowing of a cock really contains this letter. It sounds in this, and other bird cries, more like the audible opening of the glottis for which our alphabet has no letter, though I believe there is one in Arabic, where we transliterate by *k*. In English we render the same sound by *c* in cough, and by *h* in ehem. The Japanese language also makes it a root-of-tongue sound in the onomatope for coughing, viz., *kon-kon-kon*. Is "crow" (Hebrew *iqara*) an abbreviated onomatope?

Bekkakō is also used as a derisive word accompanied by the gesture (not unknown to ourselves) of pressing down the lower eyelid with the fore-finger.

Kake (O.L.) .... The common fowl. Cf. English cock, cackle.

I take these words to be abbreviated imitations of the cry of the hen when she has laid an egg. It is the same cry which the cock utters in response, and is also the note of indignation of both sexes when there is no question of egg-laying. The *k* in this case seems to me to be a true root-of-tongue sound and not the glottis sound above described. The final *e* of *kake* is a phonetic necessity of the Japanese language which will not allow a word to end with any consonant but *n*. This word is now obsolete.

To-to-to .... This is the cry with which the Japanese call fowls to be fed.

[1] Vide Tylor's "Primitive Culture," 3rd Ed., vol. i, p. 207. I take this opportunity of acknowledging my numerous obligations to the chapters on language in this work.

It is obviously an imitation of the cry of a hen to her chickens, or of a cock to his dames for the same purpose. Cf. Engl. *chuck-chuck*, provincial *tyook-tyook*, with *tyooky*, a nursery word for fowl, Chinese *chu-chu*, Corean *ku-ku*. The Japanese word for bird, viz., *tori*, may perhaps be derived from this.

Hiyo-ko (O.L.) .... A very young chicken, a peeper. *H* in Japanese is a labial, and probably represents a prehistoric *p*. *Ko* means little one. Cf. French piailler.
Kako (O.L.) .... The cuckoo. There is no *k* in the cuckoo's note. As usual, it is a glottis sound which is thus represented.
Hototogisu[1] (O.L.) .... A species of cuckoo (Cuculus poliocephalus).

Blakiston and Pryer state that "the note is very different from that of the cuckoo, being the syllables *ho-tuk-tuk* constantly repeated as it flies from bush to bush." My own impression of its cry is, that it oftener runs to five or six syllables than three, and I would prefer to say that it has *some resemblance* to *ho-tuk-tuk*. The termination *su* also occurs in the onomatopoetic words *uguisu* "a nightingale," *karasu* "a crow," *kigisu* or *kigishi* "a pheasant," and *kirigirisu* "a grasshopper." It may be the *shi* or *su* of the verb *suru* (root *shi*) to do. *Hototogisu* would then mean the bird which makes the sound *hototogi*.

Poppo .... (Pronounce pope-poe.) The pigeon's cry.

The Latin *pipio* looks like this, but has probably a somewhat different origin.[2] The Japanese word for pigeon is *hato* (for *pato* ?) and the Corean *piteulki*, where *to* and *teulki* mean "bird."

Kā-kā .... Cry of the crow—our caw-caw.

The *kara-su* (obviously an onomatope) or Corvus Japonensis is a bird intermediate in size between the Carrion Crow and the Raven. I have observed that the word for black (in Japanese *kuroki*) in several Asiatic languages seems derived from the name of this bird. Note that the French *Croua*, for the crow's cry, also contains an *r*.

Kachi-garasu (O.L.) .... This is one Japanese name for the magpie, a rare bird in Japan. It is really the Corean word *kachhi*, magpie, prefixed to the Japanese *karasu*, crow. *Kachhi* is obviously onomatopoetic.
Ga-ga .... The quacking of ducks.
Uguisu (O.L.).... .... The Japanese nightingale (Cettia cantans).
Chiu-chiu .... Chirping of sparrows.
Gan (O.L.) .... A wild goose.

This word is of Chinese derivation. Cf. Greek χήν, Engl. *gander*, &c. The dictionaries derive χήν from χαίνω "to gape,"

[1] There are two other cuckoos in Japan, with names taken from their cries. See Blakiston and Pryer in "Japan Asiatic Society's Transactions."
[2] See Tylor's "Primitive Culture," vol. i, p. 207.

but both *gan* and χὴν are surely onomatopoetic, the initial root-of-tongue motion being the only one consistent with the gaping position of the beak of the bird as he utters the cry, and the *an* or *ην* representing the cry itself.

Nasals are not common in onomatopes of birds' cries, the reason probably being that a bird's nostrils are very small, and the nasality of their utterances therefore a negligable quantity. It is a certain metallic ring in the cries of some birds which we attempt to render by nasals. This quality in the cry of the wild goose was recognised by Homer, who speaks of the κλαγγὴ of wild geese and cranes, and by White of Selborne, who says the cry of the goose is "trumpet-like and clanking." Note that *gan* is also the Japanese onomatope for the sound made by a metal vessel falling to the ground.

Kin .... The cry of the pheasant (Phasianus versicolor).

Probably *kigisu* or *kigishi*, an old word for pheasant, may be derived from this. The Corean word for pheasant is *kiŏng*. The crowing of the cock-pheasant is well represented by a Corean word *tŏl-kŏki* the syllable *kŏk* being made long and strongly accented.

Mŭma (O.L.) .... A horse. Cf. Chinese *ma* and Corean *mal*. A doubtful onomatope.

Hin-hin .... The neighing of a horse. Cf. English *hinny*, *neigh*, French *hennir*.

Kon-kon ....
Ken-ken .... } The fox's cry.
Kai-kai ....

Wan-wan .... The barking of a dog. Cf. English *bow-wow*, Shakespearean *bowgh-wowgh*, French *Ouah-ouah*.

It is curious to observe the variety of ways in which the ending of so familiar a sound is rendered. *N* is a nasal tip-of-tongue sound, *w* an aspirate labial, *gh* an aspirate root-of-tongue sound, and *h* a glottis sound. The Japanese choice of *n* for this purpose is the choice of Hobson, there being no other final consonants in Japanese. It may be noted that whereas the Japanese reduplication is simple, the English reduplication, here and in other cases, is with a difference.

Hoyeru (O.L.) .... To bark, may perhaps be compared with the French *aboyer*.

Kiyan-kiyan .... A dog's whining or yelping.

Niau .... } The mewing of a cat. Cf. Chinese *miao*, which
Nya .... } stands both for the cry and for the animal.

Ne-ko (O.L.) .... A cat. Possibly the *ne* is the same as the *nya* just mentioned. *Ko* means a little one.

Goro-goro .... The purring of a cat. Cf. French *ron-ron*.

The cat's mouth is shut when it purrs, and therefore the tremulous sound which we represent by *r* cannot proceed from the tongue.

Chiu-chiu .... The squeaking of rats. Cf. the Corean word for rat, viz., *chiui*.

Giu-giu .... The croaking of frogs.
Gya-gya .... Ditto.
Bum-bun .... The buzzing of insects. Cf. Latin *bombitare*, Greek βομβέω, English *hum*, Scotch *bum*. If Grimm's Law had any application to these words, the last should be *pum* instead of *hum* or *bum*. *Bun* is Chinese and Sinico-Japanese for mosquito. Hence the facetious saying that his buzzing is meant as a polite self-introduction to his intended victim.
Kirigirisu (O.L.) .... A grasshopper.

CHAPTER V.

Imitations of Musical Sounds.

The limitations of the Japanese phonetic system appear very distinctly in this class of words. There is no final *m* or *ng*, so that onomatopes like *tom-tom* and *ding-dong* are impossible.

Gö....ö....n.... .... Sound of a large bell.
Bon .... Ditto.
Gan ....
Chon .... } Sound of a small bell.
Chin ....
Chan ....
Shan-shan .... Sound of bells hung to a horse's neck (grelots).
Don-don .... Sound of a drum. Cf. *tsutsumi* (O.L.), the name of a small drum struck with the finger-tips. Cf. also the English rub-a-dub.

Den .... }
Ten-ten .... } Sound of a drum.
Ten-kara .... }
Kan-kan .... Sound of the *tsutsumi*. See above.
Pon .... Ditto.
Chin-chin-chin .... Striking of a clock.
Chan-ten chan-ten .... Twanging a *samisen* (Japanese guitar).
Pempera-pempera .... Ditto.
Tsutsu-ten .... Ditto.
Pon .... Sound made by a thickish (bass) string when struck.
Pin .... Sound made by a thin (treble) string when struck.
Piu .... Sound of a railway whistle.
Bū-bū .... Blowing a horn or conch.
Bu .... }
Bū .... } Sound of a wind instrument. The initial consonant is for the gesture of blowing, the vowel
Pi .... } for the sound.
Pū .... }

Fuye (O.L.) .... A flute.
Hora (O.L.) .... A conch. Cf. *Hora-hora*, an onomatope for a hollow sound.

The following English onomatopes of musical sounds from Ralph Roister Doister are added for the sake of comparison:—

Twangle dome twang Sound of a lute.
Toodle loodle poope .... Sound of a recorder.
Thrumple dum thrumple dum thrum .... } Sound of a gittern.

Chapter VI.

Imitations of Noises and Motions (other than those of the organs of speech).

I have endeavoured in the following list to make a distinction between onomatopes in which the elements of sound-imitation and motion-imitation respectively predominate, but I do not pretend to think that I have done so very successfully. Nearly all contain both elements.

The general principle (subject to exceptions) is that the mutes represent motion, and the vowels and nasals sound, while the aspirates and *r* (Japanese has no *l*) may stand for either.

Noises.

Ja-ja .... Plash of water.
Shā-shā ... . Ditto.
Shu-shu .... Water trickling or running away.
Shū-shū .... Hissing sound of water on something hot.
Pyô to .... Whizzing of an arrow.
Gan .... Sound of a metal vessel falling to the ground. The verb βομβέω is used for a similar sound in Homer.
Kararin .... Sound of metal falling.
Gatan .... Sound made by falling as on a wooden floor.
Gara-gara-pin .... Noise of locking a door.
Pon-pon .... Sound of firearms. English *bang-bang*, French *pan-pan*.
Don-don-don .... A continual thumping noise.
Dô to .... With a "thud." Cf. Greek δοῦπος, a sound made in falling to the ground.
Domburi to .... } Sound of falling into water with a "plump."
Zambun to ....
Zambu to ....
Dobun to ....
Pokan to ....
Dzubu-dzubu .... Onomatope used of a ship sinking.
Chin-chin .... Water simmering.
Gō-gō .... Sound of a torrent.
Gō-meku (O.L.) .... To make a loud creaking or rumbling noise.
Goro-goro .... } Rumbling as of a cart, the bowels,
Koro-koro .... }

Compare Burns' phrase "some curmurring in his guts" where, as usual in English onomatopes, a letter is changed in reduplication. Motoöri, the most famous of Japanese scholars and grammarians, thinks that this onomatope is the origin of the word *Kokoro*, heart. *Kokoro* is not applied to the material anatomical heart, for which the Chinese word *shin* is used, and Motoöri believes that it first meant the bowels and inwards generally. The belly is at this day the seat of wisdom with the Chinese and Japanese (as it was of feeling with the ancient Jews).

What business have the root-of-tongue sounds in these words? They do not exist in the thing represented. We should be very much surprised indeed to hear *k*'s or *g*'s issuing from that part of our organization. Nor is there anything in the motions accompanying the sounds in question to suggest mute consonants. The reason for their presence must be sought elsewhere. As shown above, the pronunciation of *o* requires a number of well-defined movements of the organs of speech. But within the limits thus laid down, there is still room for variety, one kind of which depends on the precise position of the tongue and lower jaw. If we wish to produce a deep, resounding *o*, which shall recall the hollow, rumbling noises indicated, we lower the jaw a little more and retract the tongue (which for an ordinary *o* lies on the floor of the mouth, with its tip touching the lower gums or teeth), so as to leave the cavity of the mouth large and empty. The result of this is to thicken out the tongue at the base so as almost to close the passage of the throat—in other words, to bring it nearly into the position for pronouncing *k* or *g*.

Todoroku (O.L.)	To rumble as of thunder, carts, beating a hollow vessel, &c.
Doyo	Noise.
Doyomu (O.L.)	To make a noise.
Hoku-hoku or *Poku-poku*	Said of the sound of the hollow "fish-head" of wood used in temples for a drum.
Saya-saya	A rustling noise as of silk, leaves on a tree, &c. Cf. *sasa*, whispering.
Soyo-soyo	
Su-su	
Soyoro....	
Gasa-gasa	
Goso-goso	
Hiso-biso	Secretly, stealthily.

The whirring sound made by a wheel in rapid revolution, as represented by *r* or *l*, enters into onomatopoetic words in many languages. In Japanese (which has no *l*) we have—

Kuruma (O.L.)	A wheel, a wheeled vehicle, a mill.
Guru-guru	Rolling or turning over.
Guri-guri	Expresses roundness.
Gururi to	In a circle. Cf. Greek γῦρος, a circle.

Kororí.... ....
Koro-goro .... } Of tumbling over.
Korobu (O.L.) .... To tumble over.
Meguru (O.L.) .... To take a circuitous route.
Kiriri ... . Twisting round.
Jirori-jirori .... Rolling the eyes.
Gioro-gioro .... Ditto.
Gororí-gororí .... Tumbling about when drunk.
Maru (O.L.) .... A circle.
Mari (O.L.) .... A ball.
Maruki (O.L.).... .... Round.
Marobu (O.L.) .... To roll over.
Maromeru (O.L.) .... To make round.
Yoro-yoro ... . Rolling about unsteadily.
Yoro bōu (O.L.) .... To reel as a drunken man.
Hioro-hioro .... Reeling about.

Dzuka-dzuka .... A tramping noise.
Doka-doka .... Noise of clogs on a wooden floor.
Bata-kusa .... Ditto.
Doya-doya .... Ditto.
Bata-bata .... Ditto.
Pata-pata .... } Sound of repeated flaps, slaps, claps, &c. The latter also conveys the idea of warmth according to Hepburn.
Poka-poka ....
Bachi-bachi .... Clapping of hands.
Pachi-pachi .... Crackling of flames.
Kachi-kachi .... } Sound of striking something hard, as an arrow on a hard target, castanets, &c.
Kachiri ....
Kottsuri ....
Tashi-dashi .... Rattling of hail.
Gottsuri .... } Hard things knocking against each other.
Gokkiri ....
Poki-poki .... Sound of cracking.
Guza to .... (The *a* strongly accented.) Pricking, stabbing.
Gussari .... Ditto.
Guzari.... .... Ditto.
Poro-poro ....
Boro-boro ....
Poto-poto .... } Sound of falling drops, dripping.
Pota-pota ....
Bota-bota ....
Pottari ....
Potchiri .... Just a drop, something tiny.
Pottari .... Ditto.
Pottsuri .... "Spitting" rain, mice nibbling.
Potsu-potsu .... A little (drop) here and there.
Para-para .... Sound of heavy rain
Bara-bara .... Of a loud crashing or rattling noise.
Sara-sara .... Noise of moving a bamboo screen.
Kishi-meku (O.L.) .... To make a creaking noise (as a cart-wheel).
Gata-gata .... A rattling noise.
Zabu-zabu .... Sound of wading in shallow water.
Sawa-sawa .... } Noisily (of voices).
Zawa-zawa ....
Sawagu (O L.) .... To make an uproar.

Gaya-gaya .... An uproar, din of many people talking at the same time.
Wappa-sappa .... Sound of jollity.

Motions.

Hoto-hoto .... Tapping at a door.
Hata-to .... Striking.
Pata-pata .... Of repeated blows.
Bottari ....
Battari ....
Dossari .... } Of coming down with a "flop."
Pattari ....
Bassari .... Of anything soft falling to the ground.
Tata ku (O.L.) .... To thwack, knock.
Futa-futa .... Flapping of a fan.
Poko-poko .... Jogging along.
Dabu-dabu .... Of a horse jogging along.
Kappa-to .... With a flop.
Kat to .... Flaring up with anger.
Pot-to .... Sudden flushing.
Wat-to.... .... Bursting out crying.
Met-to or *Pat-to* .... Anything bursting out suddenly.
Dot-to .... Of a sudden burst of noise.
Piku-piku .... The beating of the pulse.
Zuki-zuki .... Painful throbbing.
Biku-biku .... Wincing.
Bikkuri .... Starting in alarm.
Gikkuri .... Ditto.
Pokkuri .... Of a sudden motion.
Puttsuri .... Of something snapping.
Buru-buru .... Of trembling. Cf. French *Brrr*.
Furuü (O.L.).... .... To tremble.
Wana-wana .... Of trembling.
Wananaku (O.L.) .... To tremble.
Dokkoi.... .... Putting out one's strength as to lift a heavy weight.
Gui to .... Ditto. Represents holding the breath previous to making an effort.
Hishi-hishi to .... Of making an effort.
Osu (O.L.) .... To push, shove. Cf. also Greek ὤθω, to push.
Surari to .... Of any swift, sweeping, unobstructed motion, as of drawing a sword.
Sura-sura to .... Smoothly, glibly.
Soro-soro .... Gently, slowly.
Shonara-shonara .... Of the gentle, easy walking of a woman.
Mishiri-mishiri .... Of quiet treading.
Jiri-jiri .... Of a gradual motion.

Note in the above six examples the absence of mutes which would convey an idea of abruptness.

Tatsu (O.L.) .... To stand up.

This verb is conjugated as follows:—Pres. Indic. *tatsu*, future *tatan*, perfect *tateri*, stem *tachi*, giving an irreducible element *tat*, which may be called the root. *Tsu* and *chi*, as already

pointed out, are merely the Japanese way of saying *tu* and *ti*. Is *tat* an onomatope? I believe it is. Now at any rate it has an onomatopoetic quality. There is no other motion of the organs of speech so well adapted to render the rising to an erect posture as the straightening out the tongue with its tip touching the teeth or gums, as is done in pronouncing *t*. In *tat* the motion is repeated, as is so frequently done in the case in onomatopes. Nor is the vowel sound quite a matter of indifference. If any sound is made in getting to one's feet, it is that of a stamp on the ground, to render which, *a* is obviously more suitable than *i*, *u*, *e*, or even *o*. Cf. Chinese *tah*, to put the feet on the ground, to tread. There is a Japanese onomatopoetic adverb *jidanda*, which prefixed to *fumu*, to tread, gives it the meaning of our "stamp." It is almost an exact equivalent of our "stand" when the phonetic differences of English and Japanese are allowed for.

An analysis of the English word "stand" yields similar results on the assumption that its primary meaning was "to get to one's feet." It is at any rate probable that it originally meant an action, and not a state. The initial *s*, indicative of effort, favours this view, and actions lend themselves more readily to onomatopoetic imitation than conditions of rest. Even if the action is not that of standing up, but of putting down one's foot firmly, and hence "staying," "stopping," the difference is not great. The *n* I take to be a mere euphonic ornament.

Neither French nor Japanese have any word for "stand." This idea is expressed in French by *se tenir debout*, and in Japanese by a similar phrase.

Utsu (O.L.) .... To strike.

The root is *ut*. It can hardly be owing to chance that the letter *t* is so prominent in words for striking and touching in many different languages. In Japanese we have, besides *utsu*, *ataru*, to hit or touch, *tsuku*, to thrust, *butsu*, to beat, and *tataku*, to rap, to thwack. Then there are the Latin *tundere*, to thump, *tangere*, to touch, *tax-tax*, an onomatope for beating, and *taxare*, to touch sharply. In Greek there is *τύπτω*, to strike, *τυγχάνω*, root *τυχ*, to hit the mark, and *τιτύσκομαι*, to aim at, to hit the mark. The Chinese for strike is *ta* or *t'ah*, and the Corean *chhi-ta*, where the aspirates, like the initial aspirate in strike, seem intended to convey the idea of force.

It may be admitted that the motion of the tongue in pronouncing *t* represents but feebly the acts of standing up or striking. But every art has its limitations. The materials at the command of the onomatope-maker are confessedly scanty, and he has got to make the best of them.

CHAPTER VII.

Unclassified Words.

THE words in the following list have no very obvious expressive quality. Some are doubtless sham onomatopes—mere conventional words in disguise—but as they are nearly all words of recent origin for which no derivation can be assigned, it seems improbable that this can be the case with many. The Japanese themselves recognise them as distinct in kind from words of the ordinary language by printing them in different type, and in other ways.

It is also possible that in some cases the connection between the word and its meaning may have been owing to chance circumstances independent of derivation, and without the aid of any natural fitness in the word itself to convey the idea attached to it. But it does not seem probable that this can have been of frequent occurrence, or if it did happen, that the words so formed would often have permanent currency.

It is more probable that the majority are genuine onomatopes. A change of sound or meaning may have obscured their original expressive quality, or, owing to differences of fashion in the matter, what sounds inexpressive to us may have a quite recognizable meaning to the Japanese. Our music gives them little pleasure, and *vice versâ*. It is also to be remembered that when first invented they would be accompanied by aids of gesture and vocal intonation, and would be used under circumstances calculated to make the most of whatever expressive quality they possessed. Opportuneness is a highly important factor in making such words intelligible. Even the best onomatopes cannot afford to dispense with assistance of this kind. "Bang" is not a bad onomatope, but if you say it to a person ignorant of its signification, in a quiet tone of voice and apropos of nothing, he will not know what you mean. But if you raise your voice, and make the gesture of firing a gun, you will probably be understood, and he will certainly understand you if your imitation immediately follow the actual discharge of fire-arms.

Bonyari	Dulness.
Bot-to	Dim, mazed, dull.
Pokan to	In a vacant, absent manner.
Shā-shā	Brazen-facedly.
Bisshori .... }	Thoroughly drenched.
Bisho-bisho .... }	
Jiku-jiku	Wet, moist, damp.
Bichi-bichi	A springing, jerking motion, as of a live fish thrown on the ground.

Bottori....	....	....	In a soft, quiet, silent manner, or like anything soft and wet falling.
Bottari	....	....	
Bottara	....	....	
Pocha-pocha	....	....	Round and fat, as of the face.

The Japanese language has hundreds more of these words.

Chapter VIII.

Children's Words.

Onomatopes

Wan-wan	....	....	A dog.
Nyā-nyā	....	....	A cat.
Chiu-chiu	....	....	A rat.
Shii	....	....	*Mingere*—an imitation of the encouraging sound made by nurses.
Un-ko	....	....	*Faeces.* *Ko* means small, *un* is possibly onomatopoetic.
Bā	....	....	Hot water for drinking. Perhaps from the gesture of blowing to cool it.

Words altered from the ordinary language.

Nenne....	....	....	To sleep, a baby, from *neru*, to sleep. &c., &c.

Words of uncertain origin.

Ototsu	....	....	Father.	
To-to	....	....	Ditto.	Cf. English dada, Greek ἄττα.
Te-te	....	....	Ditto.	
Chi-chi	....	....	Ditto.	
Okka ..	....	....	Mother.	
Ha-ha	....	....	Ditto.	The last is probably for an older *papa*.

Chichi and *ha ha*, although originally children's words, now form part of the ordinary language. *Chi-chi* also means milk, the breast.

Some of the above words may have originated in the child's earliest articulate utterances being fitted on by his parents or nurses to his first wants or ideas very much at random, and without reference to expressive quality. The reduplication was perhaps meant to give them a false air of being onomatopes, and also to afford the hearer two chances instead of one of catching the word.

Chapter IX.

Recapitulation.

The more important of the principles of language illustrated in this paper may be briefly recapitulated as follows:—

1. The first speech of mankind consisted of natural cries, which I have classified as shouts, grunts and hisses. These were developed into interjections (oh! no! hush!) by a two-fold process. The ideas became more distinct and definite, and the sounds, at first differentiated only by tone, became articulate.

2. From such interjections there have been derived a very considerable proportion of the grammatical forms and particles of the Japanese language, such as case signs, honorific and interrogative particles, the signs of the indicative (?), optative, conditional and imperative moods, and of the causative (?), and negative verbs. A good many words of the general vocabulary may be traced to the same origin.

3. A further stage in the development of language consists in the imitation of such non-significant vocal sounds and motions as blowing, spitting, gulping, and coughing.

4. It is here that mankind found a model for the mute consonants.

5. It was also at this stage that the imitations of motions by motions of the organs of speech began.

6. In onomatopœia mute consonants are usually expressive of motion, vowels and nasals of sound, the aspirates occupying an intermediate position.

7. Ordinary onomatopes such as rat-rat, bow-bow, &c., are of late origin, and can throw little light on the genesis of speech.

8. Letter correspondence in like onomatopes of the same or different languages follows the classification into mutes, aspirates and nasals. It is only where there is some special reason for this that the variations occur between sounds made by the same organ of speech as in ordinary philology.

JANUARY 9TH, 1894.

Professor A. MACALISTER, F.R.S., *President, in the Chair.*

The Minutes of the last Meeting were read and signed.

The following elections were announced:—

J. R. MORTIMER, Esq., of Driffield, Yorkshire.

Dr. LENNOX BROWNE, F.R.C.S. Ed., Mansfield Street, W.

The presents that had been received were announced and thanks voted to the respective donors.

The following papers were read :—

"Ethnological notes on the New Hebrides," by Lieut. BOYLE T. SOMERVILLE, R.N.

"Funeral Rites and Ceremonies amongst the 'Tshinyaï' (or Tshinyungwe), and other notes," by LIONEL DECLÉ.

ETHNOLOGICAL NOTES *on* NEW HEBRIDES (*continued*).

By Lieutenant BOYLE T. SOMERVILLE, R.N.

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IX. Weaving and Basket work.
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XIV. Cannibalism.
XV. Music and Musical Instruments.
XVI. War and Weapons.
XVII. Cultivation.
XVIII. Burials.
XIX. Boys' Games.

Medical notes by Surgeon Daniel J. P. McNabb, R.N., late of H.M.S. "Dart."

I. *General account and description of Islands visited.*

DURING the survey of the "Dart" in 1890 and 1891, the parts of the New Hebrides visited included Eáte, with its adjoining small islands of Nguna, Mau, Matáso, Mai, and Mákura; then a little farther to the north, the Shepherd group of Tongoa, Tongariki, Ewosi, Buninga, and Valea, together with the south coast of the large island of Epi; and lastly the east coast of Malekula, between Port Sandwich and Port Stanley, a distance of about 35 miles.

With the exception of the last island, the whole are altogether of volcanic, or else of coral and volcanic origin, and almost all have a wide fringing reef. Eáte contains two fair anchorages

in Havannah Harbour and Fila Harbour, while in Malekula is Port Sandwich, perhaps the best harbour for all weathers in the whole group. All of these islands are densely clothed in forest-trees and scrub—best described under the Australian name of "bush"—which is cleared in small patches by the natives for yams, bananas, &c.; and in the vicinity of the harbours above mentioned, by white traders who have there made quite extensive gardens for cultivating coffee, cocoanuts, and so on, which with every sort of tropical fruit flourish luxuriantly in the rich volcanic mould.

II. *Population, Causes of decrease, &c.*

The population is extremely mixed; many different types may be seen in any village on all of the islands, and of all shades of colour from black to light yellowish brown. The hair is tightly curled, and usually in large quantities, though not to the extent seen in Fiji, and the men are generally full bearded. It would, in fact, be hard to say which type mostly prevails, whether Malayan or Papuan; and the same applies to the languages. On the Shepherd islands only is there any perceptible difference, the natives here being of a far finer physique, lighter complexion, and higher intelligence than in Eáte for instance; and in pre-Christian days, though a good deal fewer in numbers, kept the adjoining islands in terror and subjection—like the Danes or Norsemen in our own country. This superiority may be due to the introduction of Samoan blood, concerning which is the following account in Mr. Macdonald's book "Oceania." At Mai (which is 8 or 10 miles from the Shepherd group), there arrived about forty years ago a canoe from Samoa, which must have travelled some 1,500 miles, and which contained eight half-starved people, who had sustained themselves during this long journey with a species of cheese made of compressed bread-fruit, and with cocoanuts. On landing, they were all killed and eaten with three unusually unappetizing exceptions, one of whom was living a few years ago. Mr. Macdonald has a piece of their canoe in his possession, which is represented as being a large and well-built boat.

In Eáte the population is rapidly dying out. About forty years ago this decimation began with kidnapping, followed by the "sandalwooders," who shot down the natives regardless—for there was none—of law. After this came the "labour traffic" to Queensland, which carried many off, never to return, having died of nostalgia, consumption, or the results of liquor and vice while in service. Now that these causes of decline are over, as far as Eáte is concerned, an extraordinary feature of the subsidence of the race is the fact that there has lately been

a marked disproportion in female births; nor can this be due to infanticide, the natives being all Christian.

M. Chevillard, a French settler of twelve years' standing, told me that a village near his place which he can once remember quite well with fifty or sixty souls, now contains only nineteen, of which but two are women. The peoples of the small islands to the northward, and especially of the Shepherd group, however, do not seem to be growing less: there was a downward tendency five or six years ago, yet this seems to have checked. In none of the islands, not even the heathen ones, such as Malekula, can the population be called thick. In this latter (along the coast at all events) the villages are collected in groups, and there is a long tract of seaboard with no villages at all, the result of bombardments by men-of-war—mostly French—which has caused the natives to club together or go to seek shelter farther back in the bush.

The seaboard natives of all the large islands speak of those who do not live by the sea as "man-bush." Whether these really belong to a different race it would be hard to say; it is just possible that they are the remnants of the aboriginal inhabitants who perhaps occupied the islands before the invading Malayan or Papuan stream. I had a long conversation one day with an exceedingly intelligent Malekulan, who told me that his tribe had once had a dispute with "man-bush," which was after some negotiations patched up, as the custom is, with the payment of pigs, and that he had accompanied the pig paying party. They went up into the hills by little known bush tracks, and finally arrived at the bush-men's village, which was not built like their own houses, and thatched, but consisted of circular pits in the ground, paved at the bottom and sides with stones, and with a few boughs thrown over the top. In this the family and dogs lived in such dirt that even my savage informant was disgusted, saying that "'e shtink plenty," not leaving the "house," he said, even to answer the calls of nature. They wore, however, the same costume, and had the same religious beliefs as himself, though not speaking the same language. He told me further that these people had no gardens or tame pigs, but spent their lives wandering about the bush living on wild yams, and catching wild pigs with their dogs, the men seldom being actually at home themselves, though the wives stayed there.

These bushmen are reputed to visit the sea-coast occasionally to make raids, kill and steal. It was the unprovoked murder of a woman of my informant's tribe when at work, during one of these raids, that had caused the dispute which occasioned the payment of pigs and visit to their boundaries. Two murders of

French subjects happened at Port Sandwich in Malekula while we were there, believed to have been committed by "man-bush," but as in all the islands he is the invariable scape-goat on a murder happening, we could not ascertain the truth of the charge.

III. *Traditions and History.*

The native tradition (according to the Efátese) is that the islands were fished up out of the sea by "Li maui tukituki," the goddess living in the moon, but I have heard none as to how the people came to live on them. This event is no doubt one of high antiquity, if we are to judge by the extreme diversities of dialect, which, all springing from the same root, must have taken many ages to be altered to their present conditions.

The legend in the Shepherd group is that five hundred years ago their islands were joined together and once formed part of the large adjoining island of Epi, from which they are now separated by a strait about three miles wide, but that a volcanic outburst occurred which broke them up into islands and annihilated the entire population with the exception of one man. He, it appears, had supplied himself with bread-fruit, and when the eruption began, hid himself in one of the village drums, which are huge hollowed out tree trunks stuck on end in the ground. When the disturbances ceased he came out, to discover that he was on a separate island, that everything was drowned in mud, and that everybody was dead except himself. Probably he then made his way to Efáte, as the next story is that an exploring party from that island arrived on the scene, and found but one plant growing on the new island, and from its name they called it Tongoa, and the next in size Tongariki, or little Tongoa.

Those who now live there are partly of Efátese extraction and speak a pure version of the present Efátese language, which like its speakers seems to have become much degraded; and there is a small colony of the same people living on the opposite shore of Epi, quite distinct from the real inhabitants of that island, who are said to be very fierce and savage, and always fighting amongst themselves.

Quiros, a Spanish discoverer, seems to have been the first white man to discover the group, he having landed on the island still known as "Santo" (from his name for it of "Australia del Espiritu Santo") in the sixteenth century; but little was known of it except its existence till Captain Cook visited and partly explored the main islands, landing on several of them. I was surveying on the island of Mau, a small extinct volcano lying to the N.E. of Efáte, when one of the natives volunteered to show me "Mark belong Captain Cook." On my asking what he

meant, he told me that Captain Cook (who named the island Hinchinbrook) had anchored there, landed, and cut some marks in a rock near the beach; also that he had conveyed some of the natives to Australia and brought them back again—this first instance of "labour traffic" I look upon as absolutely a fable; but for the rest I can only say that I was conducted along the beach to an opening in the bush in which, 50 yards from the shore, was a large rock of volcanic stone, with a rectangular face, and naturally smoothed. This rested on a natural wall of volcanic boulders, and at the lower edge of it were four curious marks evidently cut by some sharp implement, in the shape of algebraic brackets, and about 8 inches long. The right hand one was a good deal broken away, but the others were quite clear and sharp. The village tradition was very sound as to the fact that Captain Cook had cut these marks—"Ole fella man, he talk ole fella grandfader blong me,"—but the reason for making them did not appear. I can only conjecture that perhaps the latitude and longitude were painted within the two brackets.

During this century the islands have become better known; first during the rush for sandalwood, then for kidnapping the natives, and latterly by settled traders and "labour ships," until now, partly owing to commerical enterprise, and partly to the missionary subsidy, a small English, and a smaller French, steamer make a tour of the group once a month.

The group is not yet under any settled government or protectorate, as so many of the S. Pacific islands have been placed; but a joint commission of English and French naval officers sit at certain times of the year, and settle any disturbances between traders and natives which may have occurred since their last visit.

IV. *Clothing, Ornaments, &c.*

In the Christian islands, clothing consists of a cotton shirt and a loin cloth of decent length known by the Fijian (?) name of *lava-lava*, and often trousers and a hat, while the women wear a long shift from shoulders to feet over some sort of petticoat. I understand that in Efáte and the adjacent islands, even in pre-Christian days, a tolerably decent loin-cloth of matting or tappa was in vogue supported on a belt made of the matting like sheath of the cocoa-nut fronds, ornamented with a stitched pattern in dyed grass, and pinned with a sharpened bone from a fowl or other bird. This is still worn in Epi. The women wore a deeply fringed piece of matting which passed between the legs and was supported by a belt, so that the fringes fell over in front and behind—indeed I have specimens of this garment. In Tanna, however, and in Malekula (also, I believe, in Ambrym) any

attempt, in the male, in the direction of costume is directed towards the external genitals—usually very suggestive and disgusting. In both of these islands circumcision is customary, and as the clothing, such as it is, is connected with this practice as regards Tanna certainly, and probably with respect to Malekula, it will be convenient to give an account of it here. Mr. Grey, the missionary at Wea-Sisi, Tanna island, is my informant. Circumcision takes place usually at about the fifth year. The boy is shut up for a month at the time, and though he previously went quite naked, he afterwards adopts the costume of a full-grown man. Mr. Grey is one of the very few white men who has seen a Tanna man without his wrapper. The closest secrecy is adopted with regard to the penis, not at all from a sense of decency, but to avoid Narak (mentioned in my previous paper), the *sight* even of that of another man being considered most dangerous. The natives of this savage island, accordingly, wrap the penis round with many yards of calico and other like materials, winding and folding them until a preposterous bundle 18 inches or 2 feet long, and 2 inches or more in diameter is formed, which is then supported upward by means of a belt, and the extremity decorated with flowering grasses, &c. The testicles are left naked. A Tanna man returned from Queensland with a severe attack of syphilis, and after much suffering he decided to get medical relief from the missionary, he having some knowledge of medicine. Upon his wrappings being removed, Mr. Grey discovered that the so-called circumcision was effected by slitting the foreskin lengthwise at one place, and then rolling it back and allowing it to heal in a thick ridge, foul beyond words. This probably is similar to the method in Malekula, and would account for the ease with which the penis is there carried, also supported upward, but with much fewer means. Here there is only a sheath of banana leaf or fibre matting hanging from the waist-belt, into which the member is thrust, the testicles being left naked as in Tanna. A man who swam off to the ship one day, having disarranged his cloth in swimming, unfolded his outside wrapper on deck without any ado, and disclosed a second wrapper tightly tied behind the ridge caused by circumcision, thus concealing the glans, and offering a still larger means for upward support.

Neither in Tanna or Malekula is there any further body covering; but in the former island the hair is divided into innumerable little locks, each of which is "served over" with fibre threads, and resembles nothing so much as the ancient Egyptian royal wigs.

In Malekula three belts are worn. A narrow under one supports the penis and its wrapper, outside this is a broad strip

of nutmeg (?) bark about 6 inches wide (the investing of which is mentioned in my first paper), and a third which confines this broad bark belt, usually of plaited fibre, with long tassels for state occasions.

The women wear a narrow loin cloth, about 8 inches deep, which is adopted at an early age. It is worn beneath the buttocks, but is secured above the pubis by a belt passing round the waist. The end, to the length of a foot or more, is often in open-worked patterns of good design. In Santo the men are said to go quite naked, and I have a woman's dress from there which consists of a festoon of thirty or forty brown strings, on the lowest three of which white trade beads are threaded. It is secured at the back to a large billet of wood, of the shape of a fishing-lead, about 6 inches long and 4 inches greatest diameter, tapering to perforated points where the strings are secured.

Ornaments.—The hair is cultivated by the men with considerable care, but the women's is usually kept pretty close to the head: it is cleansed with lime, which gives it a yellowish appearance after use. Feathers, flowers, and combs are the almost invariable hair ornaments; sometimes all three together, and always one. The feathers may be a plain tuft of two or three, a huge plume of white cock's tail feathers a foot high, a crest made of the same, but yellow (somewhat like a North American Indian's), worn at "sing-sings," or a cone-shaped "pom pom" of clipped feathers secured on a cocoa-fibre basis.

Small wreaths of creepers are sometimes worn, while combs of bamboo or carved wood, occasionally tufted with feathers, and generally with a carved or incised pattern, are almost always used.

Beards and moustaches are customary, but after certain heathen ceremonies everybody engaged in them shaves. A man of Uripiv told me that on going on a visit to Ambrym (15 miles distant by canoe), he, with the rest of his party, were all shaved by the Ambrym people as being "new chums." The men of Uripiv were much astonished at our beardless condition; and on the first boat landing with two cleanshaven officers, and two ditto sailors, they went to the missionary and said they had never seen such a thing—the ship was manned by boys! Their own beards are never trimmed, and they vary greatly in length, some being quite creditable, while others are mere fringes.

Most of the men's ears are bored, and often have ear-rings of bent mangrove-root and a tuft of hair from a pig's back or tail in one or other, and sometimes, but not often, in both. A hibiscus flower is also occasionally inserted. The septum of the nose is often bored, but I cannot remember any instance of an

ornament being worn in it. Necklaces are rare; but in Meli, a Fijian colony near Eáte, the men wear a pearl shell trimmed round, or a large operculum ground flat: and I have occasionally seen the same elsewhere. In Malekula a couple of pig's tushes, or a collar of dogs' or fishes' teeth is sometimes worn round the neck, and almost all had a piece of broad white grass round the ankles as well as the neck. Women may also be seen, but rarely, with neck chains of small circular laminæ of sea shell and cocoanut shell, which I was told represented money, but that I think doubtful; or also numbers of shell armlets made by grinding down a large conical shell to a ring at its greatest diameter. The outside edge of this ring is often ornamented with lightly engraved dentated lines. Almost all the men wear an armlet of trade-beads of all sorts and sizes, usually blue and white, beautifully woven with fibre into elegant patterns. In Malekula the chiefs alone wear theirs on the right arm, the remainder on the left, but this distinction does not, I think, extend to the Christian islands. The tobacco pipe is usually stuck into the armlet, and the common leather pouch of Queensland station hands is worn on a leather belt for tobacco, money, and cartridges. Finger rings are much sought after by the women, and men may sometimes be seen wearing them, but they are always trade "jewels"—there are none of native manufacture.

Croton leaves, and those of a small lemon-scented flowering plant are in great demand for festive occasions, and are invariably stuck into the back of the belt, the sprays reaching sometimes as high as a man's neck. Flowers are also worn on ordinary occasions on the arms, stuck into the armlets.

V. *Painting and Tattooing.*

Painting.—In all the Christian islands painting of the body is prohibited; but in Malekula the men are almost always smeared with some colour. The favourite one is black, which is worn on the forehead, one man told me, to keep off sunstroke. I believe it is made from charcoal, and on festive occasions vermilion is also used; none of the colours seem to be laid on in any particular pattern, but just as fancy dictates. In Tanna the designs are most elaborate and hideous, but I had no time to examine them. At the "sing-sings" the women paint the entire of their face, and the whole of their infants, with bright orange turmeric or red lead; the former of which is imported to Malekula from Mai (now Christian) and elsewhere, where it was once extensively used, and is now in enormous demand among the heathen. Distemper paints, principally red lead, are a large article of trade with the "white men" in trading

boats, and will readily procure pigs, &c. The turmeric is shaped into small cones and is a very strong and lasting colour, not readily washing off. Widows and daughters when in mourning cover the whole of their heads, faces, necks, and shoulders with white lime, probably burnt from coral.

Tattooing.—Tattooing is not very common, the more usual method of ornamentation of this type being by cicatrices. I have never seen either on the face of a New Hebridean native, but I have seen it on the breasts and thighs of a few women in the Shepherd group—usually a series of dentated lines. Cicatrices may be seen on many men and women, oftenest on the breast, shoulder, and upper part of the arm, the herring-bone, elliptical punch marks, parallel incised lines and circular marks being the most common patterns, and at Uripiv I saw several men who had a "demits" or conventional diamond-shaped face surrounded by rays. I was there told that these cicatrices were made by the women, who first cut the pattern and afterwards remove the scab continually, until a permanent mark is obtained. I fancy this is done during youth.

VI. *Dwellings.*

In Efáte, and to the northward as far as Epi, including the Shepherd group, the dwellings are very rude, though strong in construction and resemble in appearance a badly made hayrick. The roof-tree is bent like a bow and is supported on several rough forked uprights. The rafters, also of bent boughs, are lashed to it, and brought down to the ground on both sides and ends, where they are spread out fanwise, and they are then pegged tightly down to the ground. Roughly trimmed boughs are now lashed over the rafters parallel to the roof tree, and over these a thick heavy thatch of reed grass is cast, which is often as much as 2 feet thick. An entrance is effected, crouching on hands and knees, in the middle of the long side; the rafters here instead of touching the ground are carried over a low ridge bar, seldom more than 3 feet high, over which the thatch hangs in a thick curtain. The entrance is almost always about twice as long as it is high. Inside all is black darkness, smell, and smoke. A fire is usually burning abreast of the entrance though no particular position is allotted to it. A very little of the smoke goes out by the door; most of it rises and blackens all the interior of the hut. The floor, except at the fire-place, is covered with mats of pandanus fibre, strong and lasting, and on these the household squat, and when night-time comes, sleep; the pillow being formed by a piece of stick resting on two short forks of wood driven into the ground.

The islands to which reference is now being made being now

entirely Christian, there are no "men's houses," but I have reason to believe that such existed formerly. The present house is accordingly divided by mat screens into "bed-rooms" at night time. Other furniture there is none, unless an occasional "trade bokis," the trophy of some returned labourer from Queensland, can be accounted as such, and the searcher for curios must hunt in the murky blackness of the rafters and thatch for spears, clubs, stone axes, arrows, and such articles, which have been slowly acquiring a thick coat of soot since they were dispensed with on the introduction of Christianity and civilisation. The houses were built in small villages of six or more, and in one lately heathen village I found a stockade, about 8 feet high, of cotton wood which surrounded each house and pig-and-fowl-run, and was entered over a pig-proof style. These villages appear to have been dotted about almost fortuitously in the bush, and seldom or never near running water or with other natural advantages; running water in fact appears to them as a most unpleasant and unnecessary adjunct to life; and it is curious to see how an almost naked man will tiptoe across a stream, holding up his loin cloth, if he has one, though the water does not come above his ankles. They are not afraid of the sea, however, though they bathe very seldom. In Eáte the missionaries are now persuading the inhabitants of the scattered houses —villages no longer—of the inland to collect in communities near the more healthy sea-shore, and have taught them to build quite tolerable huts of wattle dashed with lime, with walls, windows, neatly thatched roof, and clean coral-strewn paths leading about the village. There are no kitchen middens near the villages, as the pigs finish off all that is thrown away from the houses.

In Malekula, East Coast (heathen), a quite different type of house is built, of a much more civilised appearance. Externally it resembles a neatly thatched roof placed on the ground. I came upon some natives once building a house, and the process was as follows:—Two stout uprights, cut to the required height, with a natural fork in the head of each, were driven into the ground at the desired distance apart, and a ridge pole, well trimmed, and as straight as could be procured, was firmly lashed on the forks with pandanus fibre and strips of bamboo. Along the line where the roof was to touch the ground several small forked stumps were driven in, and two good straight poles were secured by lashings in them, one on each side of the house. Bamboos of the required length and of about 2 inches diameter were then taken and bent over the ridge pole; their ends, just touching the ground on each side, being lashed to the ground poles already mentioned. The wild bamboo of the islands is

of very thin shell compared with the Chinese variety, and is easily bent double, so that the joint passing over the ridge pole splits longitudinally on opposite ends of a diameter, and thus the bamboos lie quite flatly over it. When sufficient bamboos (at about 6 inches apart) have thus been laid, split laths also of bamboo are lashed transversely along them, and over these a neat thatch of plaited cocoanut fronds and pandanus leaves is secured.

The two gable ends of the house are now built in with lengths of bamboo lying touching one another, in two thicknesses ; the inner ones being perpendicular and the outside ones horizontal. A small square aperture occurs at one end for a door—only high enough to be crawled in at—and occasionally there is a square window at the other end : these are closed with pieces of board and matting at night, and during the midday siesta. The ordinary living-houses are small, measuring on the ground perhaps 7 feet by 14 feet : but the "men's houses," where the single men sleep *en masse*, are much larger, and the doorway is high enough to walk in at without stooping. The ground is usually quite uneven inside, and small mats of plaited cocoanut fronds are left lying about for sitting or sleeping upon. A stray pig or so may usually be found nuzzling in the dust of the men's houses, and dirt is universal.

At Port Sandwich, Malekula, there is a "tambu-house" on almost every dancing-ground where the articles used in the dances are kept, the "fish," "tambu-hats" (or masks), and so on ; also "demits," or ancestor effigies, such as would spoil if left outside in rainy weather. The "tambu-hats" above mentioned are made of banana leaves over a bamboo frame covered with clay and painted, and at Uripiv I saw one that had a very fair figure of a large sea-bird with pointed tail—like a boatswain-bird—on top of it ; and a mask painted in conventional colours hangs down in front to cover the face. At Port Sandwich I saw two gigantic bas-relief faces made of clay on a diamond-shaped wicker foundation, ludicrously grotesque and highly coloured, which, however, could not be bought, as the time for slaying of pigs on their behalf had not yet arrived. All these things are kept in a partitioned part of the house, and the rest of it is a dwelling place.

I never heard of, nor witnessed, any ceremonies on the construction of a house, but they may of course exist ; nor can I say if a dead man's house is burnt after his decease, but my impression is rather otherwise. The villages are irregularly built, and contain only a very few houses—five or six for instance—but several so-called villages, each with a different name, may occupy quite a small district with often not more

than a few hundred yards between them; each with its own "sing-sing" ground and distrust of its neighbour; with whom it is, as often as not, in a condition of feud. I never saw any built on piles into the sea, and as I mentioned before, water is rather avoided than otherwise.

VII. *Navigation, Canoes, Fishing, &c.*

The canoes of the islands we visited were all fitted with outriggers on one side. Those of Eráte are small, and will, as a rule, contain no more than five people, and that in smooth water; and in this island the original curiously-shaped matting sail has been entirely discarded in favour of trade calico, and European pattern.

In the outlying islands to the northward, and in Malekula, a far larger form, for open-sea passages, is found, together with the smaller ones.

Canoes are made of the trunk of the bread-fruit tree, partly burnt out, and partly hewn: they take a long time to make, and in the heathen islands the launching is accompanied by ceremonies of some sort.

The external shape is quite rough, the ends being just carelessly pointed off, and very few of them—I refer to the small smooth-water ones—follow a straight line between extremities, but are in every imaginable curve, and sometimes even in a double bend like an S. The upper part of the gunwale in the midship part of the canoe is tapered off to a thin edge, and holes are bored through it to which the four or five rough boughs—they are little better—which support the outrigger-float are lashed with a cross fibre (? cocoanut) lashing. The float, pointed at both ends, but otherwise as irregular as the canoe, of which it is about one-third of the length, is secured to these supports in the following way: short stout pieces of stick, pointed at one end, are driven into the midship line of the float, so that each pair forms a St. Andrew's cross. Two such crosses abreast support each outrigger pole in which it rests, and to which it is then tightly secured with fibre. As the whole safety of the canoe depends upon the outrigger, considerable care is, as may be imagined, exercised with this part of the construction. The outrigger poles generally extend out over the opposite gunwale as well, and a grating of cotton-wood or bamboo is lashed upon them on both sides of the canoe. Two paddlers sit upon these, and with one man at the bow, and a steersman aft, complete the crew.

The paddles are as roughly made as the canoe, the steering one being considerably larger than the others; there is no fulcrum used when rowing, but often for comfort of handling there is a T-head on the boom. The baler—a very important factor of

safety—is a large wooden scoop, like a French *sabot*, but rounded to the bottom of the canoe, with a handle coming, as it were, out of the back of the shoe, and extending about half-way across the opening. It is all cut out of one piece of wood.

The large sea-going canoes are built with much more care, and will hold twenty to thirty men. Their construction is as follows: A sort of keel, somewhat of the size, shape, and appearance (only with more regard to straightness) of an ordinary canoe, forms the foundation, and on it sides are built up of three or four planks—which, with only axe and knife for carpenters' tools, must give great trouble to cut out—each about a foot wide, which are lashed, or, more properly speaking, sewn together through small holes along their edges with tough fibre, caulked with the gum of some tree, and payed over with lime. The ends of the planks do not extend to the actual bow and stern of the canoe—which are formed by the keel foundation-log, sharply pointed off—but a heavy, thick board, broader at the top than at its base, where it fixes into the canoe, is planted athwartships at each end of the "hold," and the planks are stoutly sewn to it. The planks do not overlap at all, as in our boats, but as they follow the line of the end boards to which they are sewn, they form a sort of trough with spreading sides. The end boards extend a foot or so above the planking, and one of their uses is to keep out the surf when launching or hauling up the canoe.

The mast in all sizes of canoe is fitted in a rather curious and ingenious fashion. It is generally a stout, moderately straight piece of a bough, with a fork or "jaws" (as on a gaff or boom) at the foot, which rests on a stout transverse stick like a thwart, so that the mast does not touch the bottom of the canoe. It is supported on this thwart by fibre rope guys fore and aft, and the sail is hoisted on it, the halliards reeving through a hole burnt in the head. By this means the mast can be "stepped" at any part of the boat, there being several of these thwarts acting as strengtheners, and can also be inclined at any angle towards bow or stern, and lowered quickly in case of a squall.

In Malekula the system is somewhat different. The picturesque matting sail is here still in vogue, and is shaped like a sharply horned moon lying with points upward—at a distance it resembles a huge brown sea-bird. There is no mast, properly speaking, but each of the horns of the sail is supported on a longish pole (sometimes of bamboo), like a double lateen, the feet of which are lashed to form a cross. A fore and aft thwart is lashed to two of the transverse ones, and upon this the jaws thus formed ride; the whole concern of sail and spreaders being supported by guys, and can be drooped either on one side or the other as desired, or lowered quickly altogether.

Originally, and of course with a sail such as this, beating to windward was unknown (and even running before the wind in such clumsy craft is slow and even dangerous work, with the balers continually plying, and paddles working to prevent broaching-to); but with the introduction of the calico sprit-sail, an attempt is made to sail close to the wind—though I think beating is out of the question—generally with the outrigger to leeward, but I have seen it carried to windward by adventurous spirits in a light wind and smooth sea.

Decoration.—I never saw ornaments of any kind on the canoes of Efáte or Shepherd islands, but in Malekula the large ones have usually a carved conventional figure intended to represent a sea-bird's head and breast, painted green with black borders and white dots, lashed on to both ends. A long heavy tassel of fibre—I have seen very similar ones in Japanese junks—hangs from the bow, and with it in a long string, the jaws and tushes of several pigs—the relics, no doubt, of the launching ceremony. All down both of the outside edges of the sail long graceful fringes hang down, with extra large bunches at the two tips. The (heathen) natives are fond of travelling what must be considered as long distances—twenty to thirty miles—to pay visits to neighbouring friendly tribes on their own or another island. They frequently do not speak the languages of these tribes; but I fancy that "beach la mar English"—the *lingua franca* of these islands—is found sufficient; and also (as a man once told me) that they mutually understand one another, though they cannot speak each other's tongues. They sometimes remain away more than a month, probably dependent on the strength of the trade wind. The return of a canoe, or the arrival of friends from a distance, is signalized by the blowing of conches, which produce a strange bellowing sound, audible a long distance in still weather. The conches of Malekula are blown through a hole in the side of the spire; those of Efáte at the apex. I obtained in Nguna (off Efáte) a fine specimen, which has the point cut off to a depth of two or three inches, and a mouth-piece made of a young cocoanut is lashed and gummed on, which renders it much easier to blow. I understand that these conches are also used to call together members of a tribe for dances or ceremonies; but not, as far as I could make out, for war.

The outrigger canoe is in many ways very suitable to the work called for: it is exceedingly stable, much more so than an European boat of the same length; and indeed, so long as the lashings of the outriggers hold together, impossible to capsize. It may be hauled up or launched without staving on the roughest coral or boulder beaches, and—with experienced men—in surf

that would effectually swamp a white man's boat. However, it will soon fill when making a passage in anything of a rough sea, though still floating like a log ; and its slowness under paddles or sail, or both, is also very much against it.

VIII. *Fishing.*

None of the natives of the islands we visited, not even the civilised Christians, employ hook and line or net for fishing, but rely entirely on spearing or shooting with bow and arrow. These last operations take place when the tide is flooding on the reefs which fringe all these islands, and especially on moonlight nights. The highest tides, which cover the reef to the depth of about 3 feet, occur at night-time during spring, when, for the greater part of the night, crowds of men and boys bearing torches may be seen wading about and spearing fish. Fires are also lighted on the beach to attract the fish. The reefs, as a general rule, contain a number of natural basins, which, on the tide ebbing, are left with a depth of 6 or 8 inches in large flat pools. Where this does not occur the natives often make enclosures of rough stones with one small entrance ; which, though they will not of course retain the water, are useful for driving fish into at the proper height of tide, and thus offering a better chance for capture, through their not being able to find exit through the stones.

I never saw any very large takes, though there are plenty of fish. We used to catch a good many with hook and line from the ship, but caution must be observed with regard to them, as some species, which feed on the coral buds at certain times of the year, are extremely poisonous.

In Malekula I have seen the natives using a sort of net on a frame of the size and shape of a snow-shoe, with which small fish left behind in the reef-pools by the ebbing tide could be easily landed. Crayfish are evidently plentiful, as their shells are to be found in all directions on the reef-beaches ; but I never saw a native or anybody else catch one. Turtle are very common round the reefs, but are seldom caught. The heathen people will not eat the eggs—or at least, they would not at Uripiv (Malekula).

Swimming.—The New Hebrides natives are not fond of bathing, and though they can swim, are very rarely seen doing so. They swim on their sides, bringing one hand out of the water at each stroke. They are consequently not strong swimmers.

IX. *Weaving and Basketwork.*

The natives of some of the islands excel in weaving, or more properly plaiting floor mats, baskets, and (in old days) articles of

clothing, which become articles of trade with islands where this art is not practised. As far as I saw, they are altogether made by the women, and are constructed from the pandanus leaf, which is dried and cut in long shreds with a knife or piece of shell. The plaiting is done diagonally and generally with some slight pattern. Strips of all sizes are made up to 10 or 12 yards in length, and generally 2 or 3 feet wide. The better ones are finished off with a small open-work pattern at the ends, decorated with tufts of feathers, and down both sides the unwoven ends are left projecting as a fringe. They are excellent mats, stand an enormous amount of wear, and can easily be washed with soap and water when dirty.

Baskets are made of the same material and much in the same style: they resemble a square bag with two stout plaited cords forked into the sides, which, knotted together, form the handle. When the basket is full it is carried with this cord across the forehead, while the basket rests on the bent back. They are the best baskets I know of, as they combine lightness, durability, and strength to an exceptional degree.

Basket work is I think alone represented by the interweaving of cane grass to make garden fences or yam-vine supports. In the fencing, the weaving is carried rectangularly with twenty or thirty reeds to a "strand"; but in the other case, single reeds are stuck in the ground so as to slope diagonally, and are interwoven with another set sloping on the opposite diagonal.

The cocoanut palm leaf is very ingeniously woven in all the islands by plaiting together the long tongues of the frond, beginning at the rib, and joining the tips. A mouth is made by splitting the rib down the middle, and thus a very capacious basket, with a mouth fitting as tightly as a purse is quickly made. Pigs, yams, &c., for sale are usually carried in them. By splitting the rib down the middle first, and then plaiting each half of the leaf separately, a capital thatch foundation—a sort of vegetable tile—is constructed; this is largely used in Malekula, where they are also employed to form the ground covering of the inside of the hut.

X. *Pottery.*

The art of pottery, in the islands we visited, is now altogether lost; but as pieces of broken potsherds may be discovered in all directions, there is no doubt that it was understood in former days. In Santo they still make a rough red pottery, the pots being mostly of the shape of an Indian "*lota*," with a rounded base and generally a slight ornamentation near the rim. They appear to be moulded, not "thrown," but I cannot speak with any certainty on this point. On Efáte there is a legend to

account for the everywhere scattered pieces of broken pottery, which I quote from Mr. Macdonald's book "Oceania":—

"Li maui tukituki"—the primeval goddess who fished the islands up from the sea—"was carrying water home when the land had just risen (at the beginning) from the sea; the land was unstable and moving about, so she threw her water-jars down upon it, and knocked it into steadiness with the shock; but the water-jars were smashed to pieces, hence the fragments of pottery found all over the islands are called the 'buro,' or water-jars, of Li maui tukituki."

XI. *Stone Implements.*

In the Shepherd group, particularly on Tongariki, we found a few implements of the chisel nature, made of shell—probably the big clamshell found everywhere on the reefs. They are well shaped and finished, of a neolithic form, and the edges are only slightly dulled and chipped. In one village I procured three such implements mounted adze-wise in wooden handles; two being chisels and one shaped like a gouge. The back of each implement is finished in a point, and thus makes a sort of pick-axe when reversed in the handle. Besides these larger tools, there are small triangles of shell, one side sharpened like a chisel, but without handles, which are still in use for scraping up cocoanut when making a pudding, &c. The village at which I obtained the adzes had only recently become Christian, and it was suggested to me by a missionary that these implements might have been used for heathen festival purposes, and only sold now on their disuse. The natives were highly amused at my wanting them, seeing that I had good steel tomahawks of my own.

Circular discs of shell or opercula ground flat are worn as ornaments, and chains of tiny discs of shell with a hole bored in the centre—I cannot say by what means—are procurable almost anywhere also.

XII. *Fire.*

Contact with the white man has rendered the use of matches all but universal in the islands we visited. I never saw a fire otherwise produced. A man on Tongariki told me that he could make fire, though I could not persuade him to do so. He told me that on his island (Shepherd group) it was produced by rubbing one piece of stick backwards and forwards on another —as one sharpens a chisel—but that on the adjoining island of Mai, it was done by twisting a stick between the palms, the point of which rested in a hole in another piece of wood. Those who have been in Queensland often have a burning-glass with

which they light their pipes. The lighting of a fire occurs in one dance I witnessed, as described in my former paper, but it was done with a match; and I never saw any particular reverence paid to a fire.

XIII. *Food, drinks, &c.*

There are but few articles of daily food, and these altogether vegetarian. Yams (two or three varieties), bread-fruit, bananas (both indigenous and imported), and plantains with cocoanut, form the staples of diet. There are several kinds of nuts, all excellent eating, of which the almond or *ningai* is the commonest. One indigenous fruit which I have seen is known to white folk as the "Kanaka apple." It grows on a goodsized tree, and has a lovely feathery, bright lilac blossom which it sheds plentifully on the ground. The fruit soon follows, which at a little distance resembles a rather waxy, highly coloured, streaky apple. Its taste is inoffensive, but rather dry and uninteresting, with flesh like a loquat, and a large smooth stone in the middle. The betel nut palm grows everywhere, but the natives do not chew the nut as the Malays and other Easterns.

In the Christian islands the stock of food plants is increased by the taro, sugar cane, sweet potato, and papau or mammy apple. It may not be generally known that the leaves of this plant cooked in the pot with meat will render it much more tender than tropical meat generally is. Besides these, there are delicious oranges, pineapples and a large variety of the passion fruit, known as barbatine or grenadella, of the size of a vegetable marrow, which it exteriorly much resembles. A most palatable pudding is made by the natives by grating up yam or taro with cocoanut, blending the whole with the milk of a young green nut, and baking in the oven wrapped in leaves of "native cabbage," which is a small pink stemmed shrub with vine shaped leaves, and make a most excellent spinach when boiled. A fowl enclosed in this pudding and thus cooked, eaten with the pudding, makes as good a meal as a traveller in savage parts might ask for. The grating is performed either with a sharp piece of shell mounted on a heavy piece of wood, the cocoanut being scraped over the shell, or on the cross section of the stalk of a cocoanut frond, or else, as I saw in Malekula, upon a sieve made on a frame with fibre, the food being grated on the knots of the network.

For long journeys, a sort of cheese is compounded of bread-fruit, highly nutritious and compact, but evil smelling and of disgusting appearance. It is said to keep good for a long period of time, but I never had a chance nor indeed should I have been willing to test it. Otherwise fresh bread-fruit are roasted

on a small fire; and, the black burnt shell being removed, discloses the excellent floury interior with its sweet nuts. Besides the "native cabbage" spoken of above, we used (at the missionary's advice) to make spinach of "naika" and "nabisibisimata," the young shoots of a fig tree, and of the jalap plant respectively, and we found them by no means to be despised.

Meat diet.—Pigs are only eaten on festive occasions, and are not an every-day diet. Fowls are also very occasionally eaten, and, in the Christian islands, their eggs, which are apparently enjoyed, no matter how stale they may be. Flying foxes are considered as great dainties, and in the evening, when their flight begins, one may often hear the natives shooting at them with their old gas-pipe muskets. Goats are kept by the missionaries, and occasionally natives own them; but I think they seldom eat them, and only rarely use their milk.

Fish form a pretty constant article of food, and crabs both sea and land, with fresh water prawns, are also eaten The Shepherd islanders (Christian) eat shark greedily, but the Uripiv (heathen) people reject it, saying that a man dies from eating it. I have not heard of any worship being accorded to it however.

The natives do not understand the making of salt, but they will eat any given them, and I have seen natives eating breadfruit on the beach, dip it into the sea to get the salt flavour.

Cooking.—From Malekula to Efáte is entirely done in the well known earth oven, or by roasting, the food usually wrapped in wild banana leaves. The ovens contain hot stones, both beneath and above the article being cooked, and I have seen (in a Christian island, however), a sort of boiling or steaming produced by pouring water over the hot stones.

In Malekula, men and women cook their meals separately, and even at separate fires, and all female animals—sows, and even hens and eggs—are forbidden articles of diet. The natives will, however, eat white man's tinned meat and biscuit, regardless of whether it was cooked by a woman, or if it contains female meat, but I know of a native who explained that a mate of his had died in Queensland from partaking of sow, given him as a ration.

Meals.—There is only one regular meal in the day, namely, in the evening, just after sundown. Otherwise it is just a banana here, a cocoanut there, as hunger prompts. Just before sunset the women (in the heathen islands) come back from the fields bearing their loads of yams, &c., which are then portioned out and cooked.

Drinks.—I have never seen a native drink water (or indeed use it for any purpose). When thirsty, a young cocoanut is split,

and then with the head thrown back the whole of the milk is literally poured down the throat without so much as one gulp. The more civilised, however, are fond of tea, coffee, or cocoa, so long as there is plenty of sugar in them. Kava was made in Eáte and the Shepherd islands, but not, I believe, in Malekula. Its use is now discontinued, so I cannot say what the method of manufacture may have been. I never saw any other drinks; but the avoidance of the most obvious, fresh running water, which is in great abundance, and generally excellent, is very curious.

Utensils for cooking and eating are very few, cooking being done in the oven, and eating is generally off banana leaf, so there are only large oval wooden platters on which yams are grated or mashed; and, in islands using kava, kava-bowls of various forms, both generally slightly ornamented. Knives of hard wood, of several shapes and sizes, are met with for chopping and mashing yams, &c., but the fingers are always used for eating.

XIV. *Cannibalism.*

Until the introduction of Christianity ten or fifteen years ago, cannibalism was in full swing in Eáte and the adjoining islands to Mai and the Shepherd group. Mr. Macdonald, a missionary on Eáte, informed me that there was not a single middle-aged man on the island who had not at one time eaten human flesh, and that each village regarded the next simply as a larder for fresh meat. Of course this is all changed now, and they are so ashamed of this old habit that you can never get a man to confess that he has eaten part of another, though they will often acknowledge that their fathers before them "kaikai man plenty," so that it is impossible to get details about it, but the bodies seem to have been divided among such villages as were friendly. The missionaries intercepted and stopped one feast about twelve years ago, and saw the dismembered portions of a man lying in a canoe; one can only suppose therefore that no one ate very much at a time.

In Malekula we heard little, and saw nothing of cannibalism, yet I am convinced that it occurs, but more perhaps as a religious ceremony than to allay hunger. At Port Sandwich, a native solemnly assured one of our men that a young girl was to be killed and eaten after one of the dances; but I rather doubt that it really took place—the presence of a man-of-war would in any case have probably deterred them. A case which occurred in 1889 or 1890 was of a French half caste boy who was living with his (native) mother near Port Sandwich, and who being up in a cocoanut tree one day picking the nuts, was deliberately

shot at and killed by a native, and, we were told, was afterwards eaten. Upon the mother making complaint, a French man-of-war visited the village with fire and sword, so one must suppose that something of the sort really occurred.

Mr. Gillan, the missionary at Uripiv, told me that he knew of a vendetta between two villages which had been closed, not as is usual by the payment of pigs, but by the sending of a small boy as sacrifice; and who, he concluded, was afterwards eaten.

XV. *Music, and Musical Instruments.*

The natives of the islands we surveyed must be said to be fond of music. The Christian converts readily learn easy hymn tunes, which they delight in, and sing with wonderful correctness of tone, considering everything; but often with a curious disregard of either time, or the length of an individual note, confusing crochets with minims, so that it takes a little time to make out what tune is intended. They sing only in unison, but take great pleasure in hearing the "sing bokis" (harmonium) played, and were certainly much interested in our piano.

Their own songs are altogether of the "chanty" type, one man sings a verse of varying length, and the remainder then join with vigour in a sort of short chorus. To our ears there was always a tone of sadness—rendered grotesque by the style of the songs—in their singing, due no doubt to the untempered scale, and consequent inability to change the key, and there was also an inconsequence about the finish, in not coming on the key note.

When I was landed on Tongariki, eight or nine natives used to come up every evening, and take turns with our bluejackets in singing songs over the camp fire, so I had many opportunities of hearing their music. One man had a specially large selection of songs, and he it was when our boat was being hauled up out of the surf, who gave the words to which all replied with raucous melody, hauling together at the conclusion of the chorus. They may also often be heard singing interminable songs to themselves as they paddle about in their canoes, in which the civilised ear can detect neither time nor tune.

In Malekula, the only singing we heard was in connection with the religious ceremonies, and was accompanied by beating on the drums, or the flapping of the performers' feet, on the ground. For weeks after the big feast (the "Maki" spoken of in my former paper) a mournful howling would nightly ascend from the "sing-sing" ground, with desultory "whacks" on the drum. This howling usually took the form of a chant of about fifteen notes continually repeated, to which a second voice would keep in harmony at a constant interval of four and a half tones

(by our piano on board)—say from F to A flat below it—a most lugubrious sound.

When dancing, all sing the verse together in unison, changing from one foot to the other together, coming heaviest on the right, until at the end of the verse, the leading man would cry in falsetto "Hā" to which the others replied "Hă-Hă" with a stamp of one foot; then again "Hā-Hā," "Hă-Hă," and then altogether running down the scale "Huuu," and with envigoured speed a new verse began.

The men alone sing, so far as we heard; they have as a rule high baritone and tenor voices—if such uncouth voices can be given any particular timbre—slightly nasal, but on the whole both true and flexible. The range of voice seemed to me small, but that may have been from want of knowledge on their part how to produce it: they take up a given note with ease and accuracy; in fact, in church, the teacher generally begins each line by himself, and after the first two or three notes, the remainder join in without a fault, and the same applied, as far as one could judge, with their native songs.

Instruments.—The leading instrument is, I suppose, the universal hollow gong, which is made of hollowed out bread-fruit tree trunks of all sorts and sizes, and may be from 10 feet high and 2 feet diameter, stuck upright in the ground, to little ones 2 feet long and a few inches across, which lie on their side. There is a long slit down one side of the drum ornamented with circular holes, and a rude face is generally carved just above it. The big drums are thumped with a large billet of wood held transversely in both hands, and the little ones are beaten with two small drum sticks. Miles off on a still night their sonorous booming accompanied by the quick syncopated tattoo of the small boys squatting in front of the little drums, may be heard over the sea. As each drum gives a different note, the sound is not altogether unpleasant, and well matches the wild savage songs it accompanies.

The next commonest instrument is the syrinx, or Pandean pipes made of reed grass from Eráte to Epi, or small bamboo in Malekula. In the former the bottom of the reeds are closed, but in the other both ends are open; with both the sound is produced by whistling, as it were, into them, when they give a sweet, but very low note. The pipes seem to be arranged fortuitously—I have never seen two with the same collection of notes—and my belief is that each is made for the playing of one particular tune, and no more. The same applies also to the flutes, which are made of a single joint of bamboo, closed at both ends, with the blowing hole near one extremity and two finger holes on different diameters, stopped by the finger and thumb

at the other. One in my possession has some interesting designs burnt upon it (of which I have already spoken), and which may have had reference to the words of the simple tune produced by this particular instrument.

The conch shell must, I suppose, be reckoned as a musical instrument: it is principally used to herald the arrival of a canoe. The apex is cut off in some for the mouth, and in others the hole is cut into the shell at the side, and a weird bellowing note, which may be slightly altered by thrusting the closed fist into the mouth of the shell, is produced.

The natives are fond of jew's harps: one of them may usually be found in the trade box of a newly returned labourer from Queensland; so no doubt the ease of making the notes and their uncertainty when made, weigh with them in their desire for its music.

XVI. *War and Weapons.*

War among cowardly savages such as these, is carried forward on a very different principle to ours, as it is almost entirely conducted by means of individual ambuscade—a system which the narrow paths and dense bush of the islands not only encourages, but almost necessitates. In Efáte, when war was declared, certain paths were arranged to be "paths of peace," or neutral ground, and the remainder of the country was "dangerous." No fighting occurs in the Christian islands now, so the following remarks apply to heathenry, as seen in the island of Malekula:—

When there is war, the men of the villages implicated arm themselves and squat in the "sing-sing" ground until the boldest among them ventures forth, and hides behind a tree until one of the enemy passes close enough, when he "pots" him with a rifle or musket. The use of the older weapons has almost died out, with the exception of clubs and tomahawks, which are still in favour as being certain and noiseless. I met one old (so-called) hero on the now Christian island of Tongoa, who had established quite a reputation ten years before in a war with another village, by lying in wait outside houses, and on hearing a voice within, firing at it. He had thus killed three men and escaped scatheless.

When we were at Port Sandwich, a native, returned about two years from Queensland, and who from fast living and much liquor had become partly mad, ran "amuk" with his rifle, and severely wounded a young chief of a neighbouring village. War was declared, and the young chief's friends retaliated by lying in wait and killing a man of the madman's village. Reprisals of this nature would have desultorily proceeded for an indefinite

time if the missionary had not intervened and procured peace.

Another instance of the small things which keep up the eternal feuds between villages was the supposed bewitching (by the evil eye, I was told) by a man on a friendly visit to the above-mentioned madman's village, of a child who had recently fallen ill. He was laid wait for when returning home and shot dead at about 6 yards range. A war would most certainly have begun had it not been for the courage and energy of Pére Doncéré, the mediator on the former occasion, who managed to patch up the affair. Mr. Gillan, the missionary at Port Stanley (Uripiv island), told me of a fight, more or less *à outrance*, which occurred not long after his arrival in the place about three years ago. Two small islands form the entrance to the harbour, the northern one being Uripiv, the southern Uri, and they are not more than a quarter of a mile apart. Uri has a population of about fifty, while the other has from two to three hundred. There was war between them, and Uripiv manned all its canoes, and put over to Uri with its fighting men. They landed, and having cleared the village, driving young and old before them on to the fringing reef—it happened to be low tide—advanced upon them firing their rifles until the two "armies" were only about 30 yards apart, the fusillade being feebly replied to by the unhappy fifty of Uri. By the time Mr. Gillan had arrived on the scene, some minutes later (having been obliged to paddle himself over in his own canoe), all the powder was expended, and the fighting, in consequence, at a standstill. But instead of heaps of wounded being mutilated in savage fashion by the conquerors, or dead being carried off to be eaten, as he fully expected, he was astonished to find that no one on either side had been so much as grazed by a bullet, although firing at such close range! Peace was accordingly happily arranged, and the affair closed, to the huge relief, I have no doubt, of both parties.

Weapons.—The warlike weapons in use in all the islands we visited were limited to the club, spear, and bow and arrow, augmented in recent years by the "musket" and iron "tomahawk," or light axe.

The clubs are of many patterns, lengths, and weights. They are made of heavy casuarina wood, and in Eráte and the Shepherd islands average 3 feet 3 inches in length, while in Malekula they are only 2 feet 10 inches—making a considerable difference in size and weight. The former ones have almost always a large acorn as a handle and are carried by it, while the Malekulan club generally has a strong sennit sling, ornamented with tassels, and is carried hanging from the right shoulder. Perhaps the most effective patterns of club were the wooden "tomahawk,"

which has a double concave knife edge, or the Malekulan "slicer" —like a huge butter-knife; but these are almost now superseded by the European steel (or iron) axe-head, helved on a club handle. Many of the recent murders of white men have been silently committed by this weapon, which does not betray the murderer like the explosion of gunpowder. In Makura, a tiny island near the Shepherd group alone, it is said, in the New Hebrides, a small throwing club used to be in vogue, about 2 feet long, of an elongated pear shape, pointed at both ends.

Bows.—From Eráte to Epi, the bows are long—averaging 5 feet 8 inches—strong, clumsily made, and of inelegant curve; but a marked difference is observable with the Malekulan variety, the bows here being short, averaging no more than 5 feet, easily bent, carefully tapered to the points, and of singularly graceful shape. In both cases they are strung with some sort of fibre impregnated with a gummy material.

Arrows are very similar throughout: they range from 4 feet 6 inches to 3 feet, about 3 feet 6 inches being the usual length. The reed grass of which the shaft is formed is generally slightly burnt at the joints in order to harden them, and notched at the end, but not feathered. A bunch of feathers with tips outwards is sometimes found tied round the point of the arrow, either as a preservative to the point when not in use, or perhaps to keep it soaked with poison. The head of the arrow is usually a piece of hard dark wood, pointed at the end, which is stuck into the reed, and the splice served over outside with fine fibre while the other is hollowed out to receive the point of human bone, which is about 3 or 4 inches long, and very sharp. Much wordy warfare has raged over the question of poisoning; but I can only say that of the scores of arrows I have purchased in various parts, I never was sold any without the most extravagant precautions and warnings on the part of the original owner as to the danger of touching the points, though in many cases the arrows cannot have been in use for about ten years (since conversion to Christianity), so that no doubt remains in my own mind that in any case the intention of the arrows was to be poisoned; indeed, if unpoisoned, the wound they would give would be so slight as to be of small account.

A native once told me that the poison was produced from some plant in the bush, but he would not show me which it was. Probably the common method of impregnating the arrows in a putrefying body was also employed.

In Eráte and adjacent islands, arrows without human bone points were common—the hard wood being sharpened to a square point, and ornamented on the sides with scratched patterns. Nearly all were coloured near the point over the "service"

with turmeric, white, and occasionally blue and pale green. Another sort of arrow, much larger than the fighting arrow, and often beautifully carved, is used for shooting fish, for which a three-pronged one is also employed; and I have seen special arrows besides for shooting birds, or bringing down fruit or nuts with a flat wooden or iron head like a long cone, tapering back to the shaft, or sometimes with a long spiral sea-shell, the base of which is to strike the object aimed at. Arrows tipped with stout iron wire for fish-shooting are common enough now.

Spears.—The southern spears, that is to say from Eráte to Epi, are always, so far as I saw, made throughout in one piece of casuarina wood, which wood is chosen, being heavy, close-grained, hard, and generally growing pretty straight, besides which it takes a lovely deep red polish after the application of cocoanut oil. The head is carefully, and often beautifully carved to a length of about 2 feet 3 inches in all manner of designs, giving a series of gradually enlarging barbs. It was not poisoned, the idea being (as I was told) to pierce a man with it, and then break it off in his body. The balancing point is just behind the head, from which the shaft tapers off to a length of about 6 feet, making the whole spear of an average length of 8 feet 4 inches. No throwing stick is used to increase momentum, but I should think a good thrower would send a spear with fair accuracy 20 or 30 yards. In the island of Tongariki (Shepherd group) I obtained two rough-looking spears, of which the head was formed of an entire human shin-bone, sharpened off to a point, and was told that poison was placed in the centre of the bone, where the marrow had been. These were the only instances of poisoned spears I found in the southern islands. On this island also I found a large heavy piece of a clam-shell, 1 foot 4 inches long, slightly curved, smoothly polished, of ogee section, tapering to the ends, the greatest diameter being about 4½ inches. It is very heavy for its size, weighing about 10 lbs. I could get no satisfactory use for it—it was lying on the ground outside a hut—but my impression is that it is a throwing stone, such as is used in Tanna for felling and stunning an enemy, afterwards to be dispatched with a club.

In Malekula, the spears take a quite different form, as all that I ever saw, except one curious ornamental one which I procured, were shafted with bamboo, and though some had carved wooden heads on the same patterns as the southern ones, the generality had a light point of wood or human bone, decorated at the base with a highly conventional human face (demits), and a tuft of feathers, and were poisoned. Another fairly common variety ended in a flat head from which four or five long human-bone points protruded, of course poisoned. The heads of these spears

are generally "served over" in a chess-board pattern, diagonally placed, each square being differently coloured red, white or blue. Of course these spears are much lighter than the Efátese ones, and no doubt being also straighter and poisoned, did much more efficient work, and at greater distances. Their length is about the same as the others, namely, 8 feet 6 inches.

The conventional spear used in the dances was simply a longish bundle of reed grass, with the tips of the grass left in a bunch, the other end representing the "point." Another spear also used in the dances, actually employed for pricking the pigs to bring blood—and thus supposing them killed—was made like the ordinary weapon, but the head had a tapering hard wooden point 2 feet 6 inches long and without ornament, very sharp.

I never tested any natives at arrow shooting or spear throwing, but I have often seen them practising for amusement or exercise —especially small boys. The bow is held just off the perpendicular, and the string is drawn to the eye or just beyond it. A wooden bracelet is worn on the left wrist to prevent the string from striking that hand on release.

I should say that they were on the whole bad shots, at least they reach no high degree of accuracy such as one might expect. Their range is I should say certainly not more than 30 yards at the very outside, and they probably would not hit anything at that distance except by a fluke. They are more expert at shooting fish than anything else, and they use fair judgment when doing so, to allow for refraction.

XVII. *Cultivation.*

All the vegetables that are eaten are raised by cultivation, which is carried on in small irregular patches at all sorts of unexpected places in the bush. Those who have had the advantage of three years in Queensland are, naturally, the best gardeners, and generally bring back some implement—a spade or hoe—to work with, but the usual tool is simply a pointed stick, with which and a trade bush-knife the bush is cleared, and the rich soil scratched up sufficiently for their purposes.

Yams and taro require and receive the greatest attention; and in the heathen islands there is some sort of religious function at the time of yam-planting, which is also connected with the moon, but I can give no particulars.

There are several varieties of yam, some of which grow to enormous sizes, but the most palatable are the smaller snowy white or magenta tinted ones, which are excellent when properly roasted in the ashes. The wild yam, not much larger than a potato, is also very fair eating. It is brought into cultivation in Malekula, and is much improved thereby. Both sexes assist at the time

of clearing the ground and planting, new patches being opened up when possible every year; but after that, the bulk of the weeding, training the vines, and digging devolves (in the heathen parts) on the women.

After the seedling is planted, a small hillock of earth is raised over it, in the centre of which is a short stick, and round each hillock a trellis of reed grass is built (resembling those that we put round a flower-pot as ornament) of about 4 or 5 feet in diameter, and 6 to 7 feet high. As soon as the young vine appears it is secured to this trellis, and with astonishing rapidity it winds round and round until the whole frame is covered. Few more beautiful plants can be seen thus growing than the yam, with its elegant ivy-shaped leaves, delicately tinted in all shades from deep pink to pale and finally dark green, and clasped by countless tendrils to the framework.

The yams when brought home are (in Eáte) hung to branches of trees near the hut; but in Malekula, special "larders" of reed grass are built, raised about 4 feet from the ground, in order to keep the rats away from their contents.

The "*native cabbage*" before mentioned, is cultivated, though originally wild. It is an excellent anti-scorbutic, and has a pleasant fresh taste, like a rather sweet spinach.

The *papau* or *mammy apple* grows plentifully, and is known in the various island dialects as the "bread-fruit of the white-man," so it has evidently been imported. Several excellent varieties of *banana* and *plantain* have also been imported, the original native ones being small and harsh in flavour.

The *bamboo* is not cultivated, and though used for building and other purposes in Malekula as noted, many of its other uses are not taken advantage of. In one seaside village in Eáte, salt water for washing dishes, &c., was brought from the sea in lengths of bamboo in which the dividing joints had been pierced.

Arrowroot is found wild in the bush in Eáte, and its sale after preparation by the natives, has paid for the printing of the Bible in their own tongue, the erection of churches and school houses, and other beneficial works.

The native gardens are almost always fenced in with reed grass, which forms a very efficient barricade against wandering pigs, &c. Straight sticks from the cotton tree are also used, which soon throw down roots, and eventually spread into an impenetrable hedge.

Pigs, fowls, and dogs are said to have been brought into the islands within the last one hundred years, and Captain Cook has the credit of the introduction of the first two, but I cannot say with what amount of truth. It is noticeable that the same word

for dog, "kuri," is used almost throughout the group—one wonders if it can have any connection with our English word "cur."

No attention is paid to breeding, so that the pigs and fowls are as a rule small; the chief endeavour is to rear boars with as large and circular tushes as possible, and to this end they are tied by the hind leg to a post at a short tether so that they shall not be able to wear them down or break them. Many tushes can be obtained perfectly circular, and I possess one of which the point absolutely grows into the root of the tooth, while another one I have seen completes two and a quarter circles in a spiral, the curves closely touching all round.

Both pigs and fowls have gone wild in the bush, and in Efáte the descendants of domesticated cattle and dogs are found also wild. The wild fowls have become small and of bantam-like appearance, and are generally of a brownish colour with all-white tail feathers. They fly and run at a great speed, and are exceedingly difficult to shoot. Dogs are used for catching wild pigs, and there is generally a number of large hungry-looking curs of pariah appearance lurking round each village, ready to bark at, and frighten away an intruder; but a few well directed stones will generally keep them off until a native whom they know comes to one's assistance.

XVIII. *Burials.*

In Efáte and those parts, the natives, being Christian, bury their dead in the earth, and I understand that those who were not cannibalized in former days were likewise buried. I have never seen a funeral either there or in Malekula (where inhumation is also practised); but at Port Stanley in the latter island, I once saw two large heaps of stones near the beach, which a native told me were chiefs' graves. I never heard of either cremation, or burial at sea in a canoe.

With regard to Efáte in heathen times I quote the following from Mr. Macdonald's book "Oceania": "In Efáte the body was carefully prepared for burial, and dressed. The burial was accompanied with much solemnity, great wailing, and animals slain in sacrifice to the dead at the grave. It was supposed that the spirits, or essence of the animals slain, would accompany the souls of the deceased to the spirit world, the entrance to which was the westernmost point of Efáte, at a place called Tukituki."

I happened to land once on Meli island, just off the shore of Efáte, where a semi-Fijian colony is established, on the day on which their chief had died. The natives asked us to remain for the ceremonies, and presently on the blowing of a

conch shell horn we assembled with the whole of the natives round the hut of the late chief. He himself was apparently laid out inside as we could not see him, and in the front sat his three wives all covered with (I think) yellow ochre and dust, wailing loudly, while a huge fat pig lay dead outside the fence, the village dogs licking up its blood as it trickled forth. Presently everybody—and we also—laid their heads on their bent arms and began to wail; a mournful sound, not unlike keening in Ireland, and quite as perfunctory. After a time we were asked to go away, which we did, and so saw no more of the affairs.

We were asked to tell the people of Fila, off which island the ship was anchored, of the death of the chief (these people, though Christian, being the kinsmen of the Meli men), and that they (the Fila men) would give us something; however, I got no opportunity of doing so, so what the gift would have been I cannot say—one does not generally give a present to the bearer of bad tidings.

In Malekula, a sort of mummy is made, of which specimens were brought to the ship at Port Sandwich by a white trader, who had procured them in exchange for a rifle at the conclusion of a "sing-sing" in his neighbourhood. They are said to be the effigies of the chief whose skull (the only portion retained of all his remains) forms the head. This is plastered with mud to represent a living face, and body of bamboo, twigs, and mud, highly coloured in black, white, red, and purple stripes, forms the figure. All "mummies" seem to be decorated with a similar design; and I would suggest that they represent the body, as laid out for burial. A small one—perhaps personating a baby—has its head founded on a small cocoanut, and others have no body, but only a stick thrust into the hole where the spinal cord passes through.

On each shoulder, a highly conventional face is moulded looking to right and left respectively, and in each hand is a pig's lower jaw with tushes. Smaller highly conventional heads on sticks, with feathers stuck in where the ears should be, and ornamented with pigs' tushes, were also brought to us by the same trader, the "tambu" having been removed off them. We were given to understand that they were held in the hand while dancing.

XIX. *Boys' Games.*

The boys are not much given to playing at games, even when they have no school to go to; however, they may be generally seen practising shooting with small bows and arrows at any and everything, though none become anything remarkable as marksmen. Occasionally in the evening a sort of "touch-last" is

played on the beach, but the boys are shy of being questioned about themselves, and so it was almost impossible to find the rules of it.

On the beach at Tongariki, where there is no fringing reef, the boys had a sort of game which consisted in tying a stone to one end of a cotton-tree stick with strips of its own bark, and then all throwing their sticks together beyond the line of surf. The stones were so selected as to be only just heavy enough to keep the stick upright in the water, but not to sink it; and the last stick to remain bobbing about outside the breakers while the remainder had either lost their stones or were washed up on the beach, was the conqueror.

Diseases *in the* New Hebrides.

By D. McNabb, Surgeon R.N.

These are not very numerous and the opportunities for investigating them not of the best.

1. *Medical Diseases.*

(*a*) *Bronchitis,* both acute and chronic, have been observed in the islands of Eáte and Mai. The acute cases occurred in patients who had become Christians and had adopted European clothing. This they never changed, allowing their clothes to become wet and dry in accordance with the weather. In connection with this I have suggested to missionaries the advisability of giving these people as little to wear as is consistent with decency.

(*b*) *Pneumonia* has also been observed in Eáte, due to the same causes as Bronchitis.

(*c*) I have had one or two cases of *Dysentery* reported to me by white people, the cases having occurred among natives in their employ. Eáte.

(*d*) *Heart disease.*—I saw one man dying from this in Malekula. There was indefinite history of rheumatism, and there was both mitral and aortic disease.

(*e*) *Malaria.*—One does not come across many cases, as it is thought nothing of, but I have seen one case in Mai of splenic enlargement due to Malaria.

(*f*) *Hepatitis.*—Under this head I had better include one case of small liver abscess occurring in a native of Epi. I drew off pus with a trochar and cannula, and the man did well.

(*g*) *Eczema* frequently occurs affecting the head, particularly in children.

There is also an eruption frequently observed round the mouths of children which very closely resembles the eruption of Hereditary Syphilis. I am more inclined to think it Syphilitic as there is frequently seen the scarring which is said to be characteristic of this affection.

This eruption too is often communicated to the mammæ of the mothers.

(*h*) *Rickets.*—Cases of this disease are sometimes seen, and the malformations peculiar to Rickets have been seen in the natives of Efáté and Malekula.

(*i*) *Scrofula.*—This is a tolerably common affection as evidenced by the sloughing out of diseased glands.

(*j*) *Spastic Paraplegia.*—One case of this was met with in Mai. The history was rather hard to get. The probable cause was exposure to cold in Queensland, and the lesion was situated in the lower dorsal region. There had probably been pachymeningitis producing pressure on the cord. There was exaggerated knee-jerk, no loss of sensation, complete loss of movement, and spastic rigidity of both legs.

(*k*) *Leprosy.*—One case of this I saw in Efáte. The patient was a man of about 35. He stated that his wife's father, who lived with them, had died of a disease in which his toes "fell off." He himself had discoloured raised patches on the extensor surfaces of both arms and legs, also on the face, lips, and ears. All these situations were anæsthetic and hyperæmic only on the affected spots.

Elephantiasis.

(*l*) Elephantiasis is common in the islands, generally affecting the lower extremities—indeed one may almost say always—sometimes both, but, more usually, one. The foot and leg are the parts most commonly involved. There are many cases of true Elephantiasis, but there is also a spurious variety, which is, I am disposed to think, due to the thickening and interference with the circulation produced by ulcers which have healed. This I would call "*Pseudo-Elephantiasis.*" It resembles the other, but can be distinguished by the dense scars which are the evidence of old ulceration.

2. *Surgical Cases.*

(1) These people bear wounds very well, and their inherent reparative power is very good. They may cover a wound over with a rag or leaf, but have no way of setting fractures or dislocations. All wounds are allowed to heal by ulceration; there is no attempt to bring the edges of a wound together.

(2) Ulcers are extremely frequent. The majority arise from scratches or wounds inflicted in going through the bush. These wounds are uncared for, and the result is a spreading ulcer. Some of these ulcers are of enormous extent, reaching from the thigh right down to the foot. In many cases the bones are exposed and become carious, and the limbs are much contorted by cicatricial contraction. Beyond covering some of the smaller sores with leaves (especially those of a plant known as "Burru" or "native cabbage") no attempt to assist nature is made. Flies are allowed to settle on the sores and feast as long as their numbers do not exceed about fifty to the square inch. It is a common occurrence to see an ulcerated native, a cripple from his sores, spending his days sitting on the ground with his ulcers exposed to the air, and every now and then switching the flies off when they become too numerous. Possibly the fact of their feeding ground being such as it is may account for the ordinary fly leaving a nasty sting on a white person after settling on him. I have seen local œdema and ecchymosis follow the bites of these flies more than once, and am inclined to attribute it to the atmosphere of septic matter in which they live.

(3) *Cancer.*—One case of cancer of the rectum was observed in Epi. The disease invaded the floor of the bladder. I performed left lumbar colotomy, and afterwards heard the man was improved.

(4) *Hip-joint, &c.*—I have seen several cases of ankylosed hip-joint, evidently the result of old disease. Also one case of strumous disease of the ankle-joint.

(5) Talipes equino-varus is occasionally seen.

(6) In children the prepuce is almost invariably long, but is always removed just before puberty.

(7) Venereal disease is tolerably common amongst the natives of the New Hebrides, no doubt chiefly owing to the intercourse with white people who live in or pass through these islands.

These diseases are also imported by returned labourers from Queensland. I have not seen many cases of acquired syphilis.

ANNUAL GENERAL MEETING.

JANUARY 23RD, 1894.

PROF. A. MACALISTER, F.R.S., *in the Chair.*

The Minutes of the last Meeting were read and signed.

The CHAIRMAN declared the ballot open, and appointed Prof. THANE and Mr. RAY Scrutineers.

The Treasurer, Mr. A. L. LEWIS, read the following Report:—

TREASURER'S REPORT FOR 1893.

The income of the Institute for the year 1893 from subscriptions, publications, and interest, was £618 6*s.* 10*d.*, being £13 8*s.* 1*d.* more than was received from the same sources in 1892. This increase is entirely due to the fact that five members paid life compositions in 1893 as against two in 1892. The sales of publications were £43 14*s.* 5*d.* less than in 1892, chiefly because three numbers of the *Journal* only have come into the year's account instead of four numbers, as has usually been the case.

The expenditure for the year was £651 4*s.* 3*d.*, being £32 17*s.* 5*d.* more than the revenue, but £40 16*s.* 5*d.* less than the corresponding expenditure for 1892. This saving has mainly occurred in two items: firstly, £15 in the rent (which will, in 1894, become £30); and secondly, £54 11*s.* 3*d.* in the cost of the *Journal*, owing to three numbers only having come into the account instead of four. Lest it should be thought that the interests of the members have not been attended to in the matter of the *Journal*, I may mention that, notwithstanding this decrease, £25 more have been spent on the *Journal* in 1893 than in 1891, in which year four numbers were paid for. Stamps and parcels cost nearly £6 more, chiefly on account of the cost of sending out the Index, but this is balanced by a decrease of about £6 in the House Expenses, in consequence of fewer meetings being held. Printing and Stationery were also diminished to the extent of nearly £9, but Salaries and Commission were increased by about £39. This increase is accounted for, firstly, by a special grant of £10 10*s.* to Mr. Bloxam on account of his work on the Index—rather as a complimentary recognition than as an adequate payment—and secondly,

by the payment to him of three months' salary on his leaving the service of the Institute.

The liabilities at the end of 1893 (other than our moral liability to life members) were :—

	£	*s.*	*d.*
Rent for one quarter	33	15	0
Journal, say	100	0	0
"Anthropological Notes and Queries"	9	0	9
Miscellaneous Printing, say	9	0	0
Index	135	8	0
Sundries, say	7	16	3
Total	£295	0	0

The assets at the same date were £710 11*s.* 3*d.* Metropolitan Board of Works Stock (worth about £800), cash in hand and at the Bankers £31 13*s.* 7*d.*, some unpaid subscriptions, and the library, furniture, and stock of publications.

It is proposed to sell £110 11*s.* 3*d.* of the Metropolitan Board of Works Stock in order to pay for the Index,[1] but the other liabilities will be met by the ordinary income, and I hope that in future the reduction in our rent and a considerable reduction in the salary paid for office work will enable the Institute to keep its expenditure within its income, and that no further sale of Stock may be required.

A. L. Lewis,
Treasurer.

[1] This has now been done—March, 1894.

ANTHROPOLOGICAL INSTITUTE OF GREAT BRITAIN AND IRELAND.

Receipts and Payments for the Year 1893.

RECEIPTS.

	£	s.	d.	£	s.	d.
BALANCES, 1st January, 1893:						
Cash at Bank	53	9	5			
Cash in hand	12	17	5			
" " Petty	2	6	0			
" " Binding account	1	1	11			
	69	14	9			
Less "Notes and Queries" account	20	14	6			
				49	0	3
SUBSCRIPTIONS:						
For the year 1893	386	8	0			
Five Life Compositions	105	0	0			
Arrears	33	12	0			
In advance	6	6	0			
				531	6	0
SALE OF PUBLICATIONS:						
Messrs. Trübner & Co.	56	16	1			
Office Sales	4	13	6			
Binding Indexes	0	12	0			
				62	1	7
BOOKS, &c., SOLD FROM LIBRARY				6	10	0
DIVIDENDS for one year on Metropolitan Board of Works 3½ per cent. Stock (less Income Tax)				24	19	3
"ANTHROPOLOGICAL NOTES AND QUERIES":						
Balance as per last account	20	14	6			
Sales	2	17	9			
	23	12	3			
Less paid for binding and illustrations	14	11	6			
				9	0	9
				£682	17	10

PAYMENTS.

	£	s.	d.	£	s.	d.
RENT (including coal and gas), for one year to Michaelmas, 1893				150	0	0
PRINTING JOURNAL, Nos. 80-81 (double number) and 82 and 83 including illustrations and Authors' copies	191	9	5			
Less received from J. A. Brown, Esq., for illustrations to his paper	2	0	0			
				189	9	5
SALARIES AND COLLECTOR'S COMMISSION				204	6	0
STAMPS AND PARCELS				46	10	0
ADVERTISING				1	13	3
PRINTING AND STATIONERY				20	16	9
HOUSE EXPENSES:						
Cleaning rooms, &c.	17	13	6			
Attendance and Refreshments at Meetings	15	15	0			
				33	8	6
INSURANCE AND MISCELLANEOUS EXPENSES				5	0	4
BALANCES, 31st December, 1893:						
Cash at Bank (including Binding account £1 1*s.* 11*d.*)	28	4	7			
Cash in hand	0	7	6			
" " Petty	3	1	6			
				31	13	7
				£682	17	10

Examined and found correct,

EDWARD W. BRABROOK,
ROBT. B. HOLT. } *Auditors.*

The Secretary, Mr. CUTHBERT E. PEEK, read the following Report:—

REPORT OF THE COUNCIL OF THE ANTHROPOLOGICAL INSTITUTE OF GREAT BRITAIN AND IRELAND FOR THE YEAR 1893.

During the past year eight Ordinary Meetings have been held in addition to the Annual Meeting.

In the course of the year the following numbers of the *Journal* have been issued: Nos. 82, 83, 84, and 85. These contain 459 pages of letterpress, and are illustrated by 21 plates.

The Index to the Publications of the Institute, including the publications of the Ethnological Society of London, the Anthropological Society of London, the London Anthropological Society, and the Anthropological Institute, covering the period 1843–91, has been prepared by Mr. Bloxam, and issued to Fellows, and the Council desire to express their satisfaction at the manner in which this volume has been compiled.

Twenty-one new Fellows have been elected during the year, viz., three honorary, and eighteen ordinary Fellows; twenty-eight have retired, been struck off by the Council, or died, also two honorary Fellows. The list of Corresponding Fellows has been revised, and fifty names removed in consequence, no replies having been received to a circular issued last year.

In the following table the present state of the Institute, with respect to the number of Fellows, is compared with its condition at the corresponding period of last year:—

	Honorary.	Corresponding.	Compounders.	Ordinary.	Total.
January 1st, 1893	46	75	84	231	436
Since elected ..	..	..	3	15	18
Deceased, retired, or struck off ..	2	50	3	25	80
January 1st, 1894	44	25	84	221	374

The following are the names of the Fellows whose deaths have been reported during the year:—

Prof. Müller.
Prof. Schaaffhausen.—Honorary Fellows.
and, Rev. L. Bloomfield.
Prof. S. Cartwright.
The Earl of Derby.
Vicat Cole.
D. Mackintosh.
T. Ridgway.
R. Young.

The Reports were adopted on the motion of Dr. J. GARSON, seconded by Mr. HOLMES.

The PRESIDENT delivered the following Address :—

ANNIVERSARY ADDRESS.

By Prof. A. MACALISTER, M.D., F.R.S., *President.*

AMONG the other obligations which are imposed by inexorable custom upon your President at the beginning of the new year, not the least onerous is that of presenting before you, in the form of an annual address, a brief review of the progress of Anthropology in general, and of the work done by this Institute in particular, during the past year; together with a forecast of our scientific responsibilities in the year upon which we have newly entered.

An Institute to whose care is committed so large and varied a subject as that with which we are occupied, whose sphere it is to learn all that can be known of man in his multiform aspects, has a heavy responsibility, and needs to prosecute its work with an energy commensurate therewith, in all directions, in order to justify its existence. These yearly periods of retrospect are useful in this way, that they enable us to recognise our shortcomings, and so we are stirred up to increased activity in those portions of our subject in which we have hitherto made the least progress.

The year which now has closed has not been one of startling novelties, nor of epoch-making discoveries; but the records of our Meetings indicate that it has been one in which the sum of our knowledge has been augmented by patient observation, extending over the several sections of that great field which it is our special function to cultivate.

In Descriptive Anthropology we have had before us valuable papers: one on Damma Island and its inhabitants by Dr. Bassett-Smith; one on the natives of Borneo by Mr. Hose; and two on the natives of the New Hebrides by Lieutenant Somerville. Few papers of greater value have been during the year published elsewhere.

In Physical Anthropology we have had under our notice a careful, critical study of the crania of the natives of Australia by Mr. Duckworth, in which it was shown that the physical characters of the skulls of these peoples furnished some evidence in favour of the theory of the supposed dual origin of the inhabitants of that continent. Now that there are three active Universities, each with a Medical School attached, in the great cities of Australia, we look with expectation to these centres of culture for fresh light on the as yet unsolved problem of the origin of the Australians. Are they the sole survivors of an old and formerly much more widely diffused black race, modified in that region by their peculiar environments; or are they a mongrel people derived from the admixture of an intrusive race of immigrants with a negroid race of earlier colonists; and, if so, what was the nature of the second factor of the population? Was it a subdivision of the melanochroic race of western origin; and, if so, to which of the existing tribes of melanochroi were these allied? If this problem be capable of solution, it is only by the more systematic collation of larger series of observations than have hitherto been made, carried out by trained investigators devoting themselves to the elucidation of this difficult research on the spot, and on this account I would commend it to the attention of our antipodean anthropological colleagues.

We have also had from Mr. Duckworth an account of two crania of natives of the singularly interesting region of Nagyr, which were brought home and presented to our Cambridge Museum by Mr. W. M. Conway, the distinguished mountaineer and explorer. This is a contribution of much value to the ethnography of a little known people who inhabit one of the most interesting and inaccessible parts of the world. In connection with this subject it is much to be hoped that some of the anthropological information which has been collected by the researches of Dr. Robertson among these and the other peoples of the Siah Posh and other tribes in this region may speedily be accessible to those who are interested in the natural history of the races of man in this district, which has been considered by some to be near the cradle-land of the Aryan section of the human family.

I am happy to record in this connexion that the work done by Mr. Duckworth has been recognised by the college of which he is a member, who have elected him to a Fellowship mainly on account of the extraordinary zeal which he has shown in anthropological studies. It is to the credit of Jesus College, Cambridge, that it is the first college in any of our Universities which has in this manner shown its appreciation of the great group of sciences which deal with the Natural History of Man.

Other important contributions to Physical Anthropology have been published elsewhere during the year, one of the most valuable being the Researches on the Physical Anthropology of the Ainos by Professor Koganei of Tokio, published in the second volume of the "Transactions of the Medical Faculty of the Tokio University." I may also refer to the researches of the brothers Sarasin, recently published at Wiesbaden, on the equally interesting island folk, the Veddahs of Ceylon.

The Historical or Archæological side of our subject has also been brought under our notice. The valuable communication by Professor Boyd Dawkins on the relation of the palæolithic inhabitants of Western Europe to the neolithic is still fresh in

our memories; and Dr. Tylor has given us a singularly lucid study in the natural history of culture in his discussion of the relation between the grade of culture attained by the Tasmanians before their extinction, and that of our palæolithic predecessors in this country.

Those who were privileged to attend the recent meeting of the British Association at Nottingham will also remember the interesting paper which was read there by Professor Hildebrand on Anglo-Saxon remains and coeval relics from Scandinavia, by which a much-needed chapter has been added to the record of those peoples with which we in Great Britain are so closely connected. Other noteworthy papers on Historical Anthropology, especially connected with America, were presented to the International Congress of Archæology held during the year at the great Chicago Exhibition.

We have not had any contributions of mark on the subject of the Linguistic side of Anthropology, but elsewhere some progress has been made in this direction. I may specially refer to the vocabularies of some of the natives in the neighbourhood of Torres Straits which have been collected and published by our Member of Council, Professor Haddon. I may also chronicle as among the most useful of the papers published this year, the comprehensive surveys of the American languages brought before the Chicago Congress by Drs. Brinton and Boas. Contributions to Technological and Æsthetic Anthropology have been made to this Institute by Dr. Man on Nicobar pottery, by the Rev. John Mathew on the cave paintings of Australia, by Mr. Etheridge on Australian weapons and baskets; and other papers on cognate subjects have been published elsewhere, such as the discussion of the origin and development of early Christian art in Britain, by Mr. Romilly Allen—read at the Nottingham meeting of the British Association.

Lastly, to that most interesting of all branches of our subject, Psychological Anthropology, we have not been inattentive. Of its outcome in Folk-lore we have had before us the study of the strange custom of breaking vessels, as a part of the

funeral rite in modern Greece, by Professor Politis of Athens, and we have had several papers on African customs, by Mr. Lionel Decle. I may also call attention to the beautifully-illustrated monograph published during the year by our member, Professor Haddon, on the "Secular and Ceremonial Dances of the Torres Straits Islanders," and, while referring to this, may I add my sincere regret that our poverty, but not our will, has hitherto precluded our publication of papers of this nature requiring expensive plates. It is to be lamented that the author has found it necessary to allow this interesting paper to be published out of the country, and it is to the credit of the publishers of the International Archives of Ethnography that they have brought out this paper in so sumptuous a manner.

The proposal to amalgamate the two Societies which in this country are interested in these subjects, was under the consideration of our Council during the past year, but as yet we have not seen our way to consummate such a union. It may be that at no very distant date this amalgamation may be feasible on satisfactory lines, and it is earnestly to be hoped that by some such concentration the hands of all those interested in this department of Anthropology may be strengthened for the more zealous collection and more complete record of those surviving fragments of Folk-lore which the march of education and the consequent unification of the race are so rapidly annihilating.

This brief survey of our work shows that we have not been idle during the year 1893, nor unduly unmindful of any of those departments of our study for which we are responsible. I must not omit also to notice that the labours of the student in anthropological bibliography have been lightened by the publication of a carefully-prepared index of the volumes of papers published by this Institute and its predecessors, extending over the fifty years of their existence. Those who will in future have occasion to refer to this admirably-compiled volume will, I doubt not, feel themselves under a great debt to the labours of our late Assistant Secretary for the pains and

accuracy with which he has completed this task, and given us a Jubilee Memorial of British Anthropology.

But great as is the amount of research whose results are chronicled in this volume, or in the corresponding records of other Societies, we cannot but confess that it is small when we compare it with the vast extent of the unknown which stretches before us in every direction, and the outlook reminds us of those old maps of Australia with which I was familiar in my school-days, in which the great blank centre was only redeemed from utter bareness by the few spider-like lines which marked the tracks of some pioneer explorer. For the great harvest which lies before us the labourers are too few, and too often inadequately equipped.

It is the mission of every Anthropological Institute to endeavour to add to the sum of our knowledge in all directions, but there is for each some special work which is peculiarly its own, and which it can do more thoroughly than any of its sister Institutes.

One of the tasks which, it seems to me, is especially laid upon this Institute to accomplish is the making of an accurate, comprehensive, and exhaustive ethnographic survey of the population of the British Isles. We are not unmindful of the value of the researches which have been made hitherto in this field. The learned authors of the "Crania Britannica" have, with commendable industry, collected and given in an accessible form all that had been done by historians and observers before their time. Several British Association Committees have also added much to our knowledge of the characters of those elements which go to make up the population of our islands The indefatigable labours of Dr. Beddoe have contributed also, in an eminent degree, to advance our knowledge in this respect; but we are painfully conscious that there is still much to be done before we can definitely say that the last word has been spoken on the Ethnography of the British Isles. The work which remains to be done can only be properly accomplished by the making of an ethnographical survey of the United Kingdom

even more complete in its nature and scope than that contemplated by the recently appointed Committee of the British Association, and we cannot rest satisfied until some such Committee co-operating with this Institute has carried out effectually this most desirable project.

Such a survey can only be successfully made by the collective efforts of trained observers in all parts of these islands, and it should not be too much to hope that some plan may be speedily devised for the organisation of a collective investigation of this nature. There is no corner of the British Isles in which there are not people of sufficient education to realise the importance of this undertaking, and if these could be sufficiently interested in it to induce them to co-operate in the great work, we might have, accumulated by their united labours, a vast body of most valuable results. I would commend to the consideration of anthropologists the recently-published paper by Professor Haddon and Dr. Brown on the "Ethnology of the Aran Islands," as an example of the method in which the work of such a survey might be undertaken in each district.

In the year 1790 the distinguished Scottish economist and statistician, Sir John Sinclair of Ulbster, conceived the idea of undertaking a great national work of a somewhat similar kind in Scotland, namely, the collection of statistical information concerning every parish in that kingdom.

For that purpose, he sent to every parish minister in Scotland a number of queries, the answers to which, when digested, constitute that marvellous body of facts contained in the Statistical Survey of Scotland. To ensure accuracy, and to awaken interest, he enlisted a number of what I may call statistical missionaries, who, each in the district assigned to him, overlooked the collection of the results. Perhaps I am unreasonably sanguine, but it seems to me not impracticable to organise some similar method for the purpose of a great collective ethnographic survey. If we could only enlist in the cause the great army of the educated classes, the parochial and other clergy, the practitioners of medicine, the board

school masters, and others of similar position, education, and intelligence throughout the length and breadth of the land, we might accomplish by their aid such a survey as would be a real ethnographic census. If a large and enthusiastic central committee could be organised, among whom the land could be divided into provinces, for each of which one or two would be responsible, and if these would take steps to procure the filling of such schedules as that which the British Association Committee has drawn up, we might be able, with such a machinery, to obtain a body of facts of lasting utility.

The time for doing such a work effectually and satisfactorily is passing. Each year this kind of information is becoming more difficult of collection owing to the growing facilities of migration, and to the increasing depression of those rural industries on which our village populations are dependent.

The mass of information thus accumulated would give us material that would aid us in answering a round dozen of the most important questions which have long vexed the souls of historians and anthropologists, and which isolated observers have been hitherto labouring to answer with only a limited degree of success. Of such questions the following are samples:—Have we surviving in our midst any representatives of the pre-Celtic inhabitants of our islands, and, if so, are such people of a pre-Aryan stock, and are they of the same type as the long-headed people whose remains we find in the long barrows? Are their affinities with such pre-Aryan races as survive in other parts of Europe, Basque, Ligurian, Finn, or Ugrian? Are these the Silures whose *colorati vultus et torti plerumque crines* were noted by Tacitus, and what element do they form in our present population in different localities? Were the Celtic immigrants a homogeneous people, or had we several successive waves of intrusive Celtic-speaking races of different characters, and, if so, what were their affinities? What relation subsisted between the Cymric and Gaidheilic-speaking peoples, and if they were separate waves, what was the order of

superposition of these strata of population? How far did Roman supremacy introduce new elements of population, and how far were these permanent? To what extent, at the present day, do people of Celtic ancestry pervade the different parts of the island, and what are their affinities, Cymric, Gaidheilic, or Arvernian? How far were the Saxon invaders homogeneous, and can the several elements of these hordes and their descendants—Frisians, Angles, Saxons, and Jutes—be discriminated among the existing people, and, if so, by what characters? What amount of Danish and Scandinavian admixture took place in later times, of what nature were these intrusive peoples, and how related to their Saxon predecessors? How far do other elements enter into our population?

These are a few specimens of the queries which we desire to solve. On the solution of such problems individual workers have expended much toil and much ingenuity, and in their answers they have too often shown a little prejudice, and, it must be confessed, an abundance of fancy. But it is reasonable to expect that some of these would be, if not completely solved, at least so far elucidated by such a survey, that our British ethnography would no longer present the involved and dispiriting aspect which it now displays.

We know much of the histories of the several races which have contributed to make up our population, but we are perplexed as to the relegation of individual existing types to their parent races. A visitor to our weekly market at Cambridge cannot but see that the assembled crowd of buyers and sellers do not form a homogeneous people. We see, as the representative of a common type, the slight, middle-sized man, with narrow forehead, moderately long head, fair or light brownish hair, straight, prominent, high-bridged nose, starting from below a slight fronto-nasal notch, on each side of which the eye appears depressed under straight and somewhat projecting brows. The narrow face ends in a narrow, weak chin, and the moderately small jaws are flanked by cheeks which are not very prominent, and seldom ruddy. Mixed with such is the

taller, burlier figure of the square-faced, broad-headed, often fair-haired man, with broad brow, more prominent cheek-bones, massive chin, broader nose, often projecting at the tip. Mingling with these are at least three other types, and many which represent intermediate characters. We ask ourselves what races do these types respectively represent, and from what parentage have they come? but hitherto we have asked without obtaining any satisfactory answer.

The labourers in such a survey would require to take account, not only of the present, but the past—the ancient monuments in each district, and especially all collections of the remains of humanity in each place; and such aids are abundantly to be found. In our own neighbourhood at Cambridge we have been fortunate in finding several series of relics of the past inhabitants. Within four miles from the town there has recently been brought to light, by the process of the removal of the soil over an extensive area in the process of coprolite digging, a large collection of the remains of man and of his works. From this one place, close to the village of Hauxton, at a bend in the upper portion of the Granta, I have obtained over a hundred skulls, and these are especially interesting, as they form a remarkably homogeneous series. They are mostly small, mostly dolichocephalic, weak-jawed, flattened at each side behind the mastoid process, so that the occipital region projects narrow and protuberantly over the feeble nuchal crests. The parietal eminences bulge so that the norma verticalis presents a somewhat elongated oval or coffin-shaped outline. The orbits have a low index, but the brow ridges are seldom pronounced, and the prominent nasal bones overhang a rather narrow pyriform aperture.

With these crania there are found implements of bronze or iron, few warlike weapons, so that it is no battlefield; only one or two battleaxes, and one or two iron spears; but there are many knives of the peculiarly truncated shape which is commonly called Saxon, adzes, implements of husbandry and domestic use, wheel-made pottery of rough construction, and

rough clay vessels, but no cinerary urns. The bodies were disposed irregularly, not oriented, and are found at depths which vary from one to five feet from the surface. In the circumjacent soil I have picked up coins of the later Roman emperors, of Burgred and Aelfred.

Who were these? Evidently pre-Christian, or at least non-Christian from their mode of sepulture; but in many particulars they differed from that series of Anglian remains which I assisted Baron von Hügel in exhuming from a pre-Christian cemetery not four hundred yards from my house in Cambridge, in which many folk had been buried, with many an ornament of characteristic workmanship. Of these latter a splendid series is deposited in our University Archæological Museum. Both differed from our last find of nine superposed skeletons which Professor Hughes and my son disinterred from an ancient pit in the chalk at Fulbourn, where they lay irregularly disposed on a stratum of broken Roman pottery. In these three series we have the remains of closely allied but not identical peoples, all differing from the large-jawed and coarsely ridged crania found with Roman pottery at Girton, and equally differing from the broad-headed remains of later date which have obtained from Barnwell and Kingston in our county. Truly there is yet much to be done in the identification and classification of these peoples.

When the Ordnance Survey was in progress in Ireland, the then Under Secretary, Sir Thomas Larcom, employed an able and accomplished Irish scholar, Dr. John O'Donovan, to visit each district which was being surveyed, to examine, as far as he could, the ancient monuments, to converse with the inhabitants, and to gather the traditions of each place. These he committed to writing, and he dispatched to Dublin Castle periodically a series of letters embodying the results of his researches. The bound volumes of these, which are preserved in the Library of the Royal Irish Academy, are classified as to counties, and they form a unique and priceless storehouse of topographical information. I would commend some such adjunct as this to the organisers of such a survey as that which I have sketched.

I have little doubt that were a survey of this nature made it would dispel many cherished delusions, and that its results would not accord with some of the common views currently held concerning our population. Our newspapers and popular periodical literature abound in allusions to the beliefs of a generally accepted ethnography which would scarcely stand the clear light of such a systematic investigation. In a recent number of a leading magazine an able writer attributed some of those difficulties of which most of us have heard as existing in connection with the government of Ireland as the results of the attempt to impose Teutonic institutions on a Celtic people. It is more than probable that our survey would show that the Celtic element is as strong in the counties of Down and Antrim, in which such troubles are least, as in those of Tipperary or Queen's County, and in neither pair stronger than in Cumberland, Devon, or Wigton.

I have spent so much time in discussing this one of many tasks which lie to our hand, that I must pass over many others to which, had your patience permitted, I should have wished to advert. The whole subject of anthropometry, so long treated on empirical lines by the schools of France, Germany, and Britain, requires to be reorganised on a true physiological basis; but as I had recently occasion to express my views on this subject, I shall not at present refer to it any further, but will only say that this can only be done by the study of the human cranium and skeleton in connection with the soft parts which cover or lie within the cavities of the bony frame. It is the advantage of having a large Anatomical School in Cambridge which gives us particular facilities for investigation in this department, and I hope soon to be in a position to formulate some definite results of our work in this matter. Every cranial and facial measurement should have some definite object, and much careful consideration is needed to determine the relative values of each of these. The introduction of anthropology as an integral part of anatomy as a subject for study in the Natural Sciences Tripos course of our University

has given a stimulus to its pursuit on the part of our younger men, and the fact that every year at least a score of men leave our school who have been trained to use their hands and eyes in practical anthropometry must produce some effect in diffusing an intelligent interest in the subject. The growth, too, of our Cranial Collection, which now contains over 2,000 specimens, gives us an amount of material for teaching which is not surpassed by any Museum connected with a teaching institution in the country. We have also the advantage in Cambridge of having the collaboration in our Anthropological School of men of experience, like Mr. Hickson, Professor Haddon, and Baron von Hügel, who are acquainted with savage men and their ways, as well as with those of our Western European races, and who can thus give a living interest to their teaching of the subject.

There is another branch of physical anthropology, as yet in its infancy, to which I would desire to refer, and in which I hope soon to see some results brought before us. I refer to the physical basis of phonetics. A former president of the Anthropological Section of the British Association, when discussing a cognate subject of which he is recognised as a master, epigrammatically stated that it was as absurd to speak of an Aryan skull as it would be to say that a tribe spoke a brachycephalic language. Perhaps so! but brachycephalism, or at least brachygnathism, must have a physical effect in linguistic expression. It is a matter of much difficulty to obtain the material for this investigation, but in comparing the arrangement of the muscular fibres of the few tongues of black races which I have been able to obtain I have been struck with the fact that there is a certain difference in the disposition, attachment, and number of the respective bundles of fibres of the intrinsic muscles as compared with the tongues of the British. When we note in addition that there are certain racial differences in the shape of the palatine vault of the alveolar arches, of the palatine folds, we cannot but believe that these also must exercise a marked effect in the relative facility with which different races can enunciate certain specific sounds. My

friend and former demonstrator, Mr. Eichholz, now Fellow of Emmanuel College, Cambridge, has in a short preliminary memoir communicated to the Anatomical Society, pointed out the racial differences observed in the alveolar arch. I am hopeful that I may be able to enlist other workers in the arduous task of research in this department, for I believe that there will thereby be much light thrown on some of the curious points with which the phonologist is familiar—why certain races nasalise so many sounds; why some in cannot easily pronounce *l*—others find the same difficulty pronouncing *r*; why sibilants are absent in some languages; why clicks are present in others. All these are physical phenomena which require to be studied from the anatomical side far more thoroughly than they have hitherto been.

There are other physical problems to which I would have alluded did time permit. The large field of study as to the cause and distribution of pigmentation and pilation, to which our Member of Council, Professor Thomson of Oxford, has devoted much time and study, is a subject of great interest, and one concerning which I hope he will give the Members of the Institute some account of the results at which he has arrived. Then there are the general questions of the origin of race characters so closely bound up with the much-vexed general problem of the hereditary transmission of acquired characters. Upon this subject I would call your attention to an interesting paper by Dr. Havelock Charles, upon the conformation of the astragalus in the natives of the Punjaub, which is associated with their habit of resting in a squatting posture. That these are not individually acquired characters Dr. Charles has been able to prove, and in a forthcoming paper in the "Journal of Anatomy" he has promised to give the record of some more extended researches, and to describe specimens which show that these additional facets exist not only in the adult but in the child, and even in the fœtus before birth. This opens up an extensive and interesting subject. That this attitude is a primitive one is probable; and that the acquired

characters are not the new facets but the circumscribed anterior articular areas present on the astragalus in the Western and civilised races is equally probable. We know that the art of the shoemaker has induced certain modifications of structure in the anatomy of the lower limbs of the higher races; it will be interesting to follow this new line of research, and to note these phenomena as examples of the changes which the art of the joiner has imposed on the human frame.

There is also a fertile department of this study of race characters opened for us in connexion with the study of the development of new characteristics in migrated races, such as those which are producing in America and Australia the modifications of form and feature which are recognisable as distinctive of the second and third generations of the new peoples of these continents. Connected with this is the examination of the changes which have taken place in the descendants of the black races of Africa, which form such an important factor in the population of the Southern States of America, a problem for light on which we have hitherto looked in vain to the active and prolific School of Anthropology in the New World. These are but samples of the enquiries yet awaiting study on the part of the investigator, and many other lines of research of equal importance will readily occur to the thoughtful anthropologist.

I have left myself no time to speak of the ethical and metaphysical sides of the subject, which are probably the most important with which the Philosophical Anthropologist can be occupied, and here there is an equal, or perhaps greater amount of work to be done. Our sister Society, whose special function it is to collect the Folk-lore of this and other peoples, has done much to preserve and collate the broken fragments of forgotten cults. We are the descendants of many races, and there are still in our midst memories of lines of thought whose origins stretch back into the abysses of antiquity. Every such relic of fossil human thought and superstition is worthy of careful record and analysis. How little do we know of the

pre-Christian religions of our forefathers, and of the mythologies which were to them articles of faith? Among the great families of the Celtic-speaking peoples from which many of us draw our blood there are surviving fragments of our ancestral beliefs embedded in our language, our traditions, and our habits, which are of incalculable value from the historic point of view. From these we learn that there was an individuality of cultus among the Gaidheilic Celts in many respects differentiated from that which prevailed among the Cymric Celtic-speaking peoples, and both these were distinct from the new phases of religious thought imported by the Teutonic tribes of the great Saxon invasion. It belongs to our province to classify and preserve these, that we may thereby be enabled to reconstruct the life-histories of the races now so inextricably blended in our populations.

Another branch of Ethical Anthropology which claims our attention is the practical subject of the Anthropology of crime, for the study of which we are so largely indebted to the Italian school of anthropologists, and especially to Professor Lombroso and his pupils, and I am glad to find that this study has been lately taken up by many of the distinguished alienists in this country from whom we hope for fresh work in this direction. And while referring to this there is another practical side of our subject which is of great importance in our criminal jurisprudence. I refer to the anatomical methods of individual identification, a research with which we naturally associate the names of Francis Galton and Jacques Bertillon, on which also we may reasonably expect additional information from these and other observers.

Our Institute has this peculiar privilege that it is the parent Anthropological Institute of the English-speaking people—that people whose representatives are to be found in all parts of the habitable globe. Would that our resources were commensurate with our opportunities. We have in the past felt the pinch of the *res angusta domi*; our membership is not a tithe of what it should be, and includes few of those who

can help us by liberal pecuniary aid; but in spite of our poverty I know of no society which has with straitened means done so much to extend our knowledge of mankind. Although we are doing a truly national work we ask no Government subsidy. We keep up an economical establishment, and are desirous of spending on our publications all that we can obtain. A suggestion has been made which is likely to be acted on; that in our office a list should be kept of those of our Members who have special knowledge of special tribes and particular populations of different parts of the world. When this is done it will be an effectual means of aiding those who purpose visiting any outlying or distant countries, in obtaining the preliminary knowledge which will enable them, with the best advantage, to deal with the races that inhabit these lands. From our shores there are daily going many whose future will lie in commerce with, or in ruling over, or in teaching peoples the most diverse; and surely it would be of enormous importance to these if in a central Institute like ours such knowledge as is possessed by our membership could be made available for Imperial purposes. In doing this we would be fulfilling a national want, and contributing in a real manner to the consolidation of the Empire.

Surely this is reason enough to induce all those interested in such a consummation to join us. We have all the machinery of this work ready to hand. The Institute possesses a valuable library, which we are endeavouring to make as perfect and as accessible as possible. We include in our membership a body of men who could easily, without extraneous help, write an encyclopædia of cosmopolitan anthropology, and if our membership could be enlarged in a degree proportional to the importance of our subject, if our wealthier classes could be but induced to interest themselves in our pursuits so as to help us to the more prompt and extensive publication and illustration of the results of anthropological researches, there would be before this Institute a brilliant and increasingly useful future: and it is the object of our fondest aspirations that this anticipation may be realised.

It was moved by Sir WILLIAM FLOWER, seconded by Sir HUGH LOW, and unanimously resolved—

> "That the thanks of the Meeting be given to the President for his Address, and that it be printed in the *Journal* of the Institute."

The SCRUTINEERS gave in their Report, and the following gentlemen were declared to be duly elected to serve as Officers and Council for the year 1894.

President.—Prof. A. Macalister, M.D., F.R.S.

Vice-Presidents.—J. G. Garson, Esq., M.D.; C. H. Read, Esq. F.S.A.; R. Biddulph Martin, Esq., M.P.

Secretary.—Cuthbert E. Peek, Esq., M.A., F.S.A.

Treasurer.—A. L. Lewis, Esq., F.C.A.

Council.—G. M. Atkinson, Esq.; H. Balfour, Esq., M.A.; E. W. Brabrook, Esq., F.S.A.; Hyde Clarke, Esq.; J. F. Collingwood, Esq., F.G.S.; Prof. D. J. Cunningham, M.D., F.R.S.; W. L. Distant, Esq.; A. J. Evans, Esq., M.A., F.S.A.; Prof. A. C. Haddon, M.A.; T. V. Holmes, Esq., F.G.S.; Sir Hugh Low, G.C.M.G.; J. Edge-Partington, Esq.; F. G. H. Price, Esq., F.S.A.; R. H. Pye, Esq.; F. W. Rudler, Esq., F.G.S.; H. Seebohm, Esq., F.Z.S.; Oldfield Thomas, Esq., F.Z.S.; Prof. Arthur Thomson, M.A.; Coutts Trotter, Esq., F.G.S.; M. J. Walhouse, Esq.

A vote of thanks to the retiring Vice-President, the retiring Councillors, the Secretary, the Treasurer, the Auditors, and the Scrutineers, was moved, seconded, and carried by acclamation.

ANTHROPOLOGICAL MISCELLANEA AND NEW BOOKS.

Blood Parasites, with directions for preparing slides of dried blood.

Recent observation has demonstrated that the blood of man—particularly in tropical and sub-tropical countries—may be inhabited by microscopic nematoid worms, the progeny of larger mature filariæ lodged in different parts of the body. It has been further observed that at least one species of these microscopic blood-worms has a wide geographical range, whereas the others seem to be confined to comparatively limited areas. It has also been established that these filariæ give rise to grave diseases—elephantiasis, chyluria, sleeping sickness, &c. Although nothing like a systematic examination of the blood of the inhabitants of different countries and districts has been made, it has already been ascertained that there are at least four species of these interesting and important parasites, the *filaria sanguinis hominis nocturna*, *filaria s. h. diurna*, *filaria s. h. perstans*, and an as yet undescribed and un-named West Indian species. Probably, therefore, extended and systematic observation would add several new species, besides acquainting us with the exact geographical distribution and pathological import of the four already known. It would be well to point out to intending observers that each of the species hitherto studied has peculiarities of habit special more or less to itself, as regards the times of its appearance in the general circulation. The *filaria nocturna* is found in the blood only at night, the *filaria diurna* only during the day, whereas the *filaria perstans* is to be found at any time of the day or night. It is believed that the West Indian species is diurnal in habit, although the point has not as yet been accurately determined. This peculiarity of habit must be carefully kept in view.

Travellers and residents in tropical and sub-tropical countries would confer a boon on zoological and medical science by investigating this subject; or, if they have not the necessary leisure and apparatus for such investigations themselves, if they would make collections of blood slides on a systematic plan, and afterwards, as opportunity offered, forward their collections to London for examination. Fifty slides from fifty inhabitants of any district would be sufficient to determine for all practical purposes the presence or absence of these or other blood parasites in that particular district. From what has been said as regards the periodicity observed by some species as to their times of appearance in the circulation it is evident that it would be well to prepare two complete sets of slides, one of day blood, the other of night blood.

The following directions may be of assistance to anyone willing to co-operate in this investigation. If further information is required, Dr. Patrick Manson, 21, Queen Anne Street, Cavendish Square, London, would be pleased to supply it. A summary by Dr. Manson of what is known on the subject up to the present will be found in "The Hygiene and Diseases of Warm Climates," edited by Dr. Andrew Davidson.

Directions to Travellers, Missionaries, Residents, and Others in warm climates for the preparation and storing of slides of dried blood.

Objects to be kept in view:—

1. To ascertain the endemic areas of the different filariæ of the blood.
2. To ascertain the proportion of the population affected within the endemic areas.
3. To ascertain if particular villages or districts are specially affected whilst others are exempt.
4. To ascertain if the parasites are associated with particular diseases, and if so, which parasite with which disease.
5. To ascertain the influence of race, age, sex, occupation, &c., and any other point of interest.

Materials Required.

Ordinary glass microscope slips, 3 inches by 1 inch, or sheet glass from which such slips could be cut. One or more thousand of such slips should be prepared. On each end of the slip a label, 1 inch by ¾ of an inch (the greater length being across the slide), of cardboard or thick paper should be gummed, so as to leave a space of an inch and a half in the middle of the slide uncovered to take the blood. A box, such as is commonly used for carrying microscope slides; it should be made of wood, and nailed or screwed, or otherwise constructed to stand heat and damp; it ought to be capable of holding thirty or forty slides. Several stout needles. A register with the following headings:—Number; name; age; sex; occupation; residence; water supply of same; travels; disease, if any; diseases of district or village, specifying particularly presence or absence of elephantiasis, sleeping sickness, craw-craw, &c.; date of preparation of slide; hour of preparation; remarks.

To prepare the Slides.

Clean the slides very carefully. Slightly constrict the last joint of the blood-giver's finger by making three or four turns of a string round it. Prick the pad of the finger so constricted with a clean sharp needle. When a droplet of blood has exuded, or has been squeezed from the prick, transfer it to the glass slip on the same side as that to which the labels are affixed. Do this by dabbing the middle of the slip several times on the drop of blood, and then with a needle or glass rod spreading it in an even layer over an area of about three-quarters of an inch by an inch and quarter.

Then lay the slip so charged on its back, flat, protecting it from dust until it is dry. It should then be placed in the box and kept dry. The labels on the slips should be marked with the blood-giver's name, &c., and with a number corresponding to that in the register containing other particulars about him. When the box is full, the charged slides should be packed away in boxes, preferably tin-lined, care being taken that they are quite dry. The slides should be tied together in bundles of a dozen or so. The thick labels will prevent the blood charged surfaces from coming in contact. The amount of blood spread on any slide should be sufficient to produce a diaphanous film having a certain depth of tint, but not too deep, as in that case the film cracks on drying and is too thick to admit of easy and successful examination subsequently. It should have a pale yellowish red diaphanous look. It is very important that the slips should be kept dry; if damp they become covered with various cryptogamic growths which obscure any filariæ they may contain.

Funeral Rites and Ceremonies amongst the "Tshinyaï" (or "Tshinyungwe.")[1]

By Lionel Decle.

When a man is dead his relatives at once begin to make a great noise and to express their grief with unhuman howlings. After a few hours they wash the dead, and dress him with his best clothes, *i.e.*, two yards of calico round his waist; his arms are then stretched along his sides, and the body is wrapped in a piece of calico that has been previously dipped in saffron. The corpse is kept for two days in the house, during which time an incessant howling is maintained; when it begins to smell too strongly the funeral is proceeded with. A hole is dug *in the house*, and the corpse, after being wrapped three times in a mat of reeds is lowered into its grave; thorn bushes are first thrown over it, and then the hole is filled with earth and carefully levelled. Above the place where rests the head of the dead a large pot filled with meal is placed, and near it a little porridge and a roast fowl are left. Then all the people clap their hands, bidding good-bye to the departed, and all retire. The house is closed and abandoned. If the dead man was a chief the whole village is abandoned.

After the ceremony all those who have touched the corpse go and wash in the river, and return near the house, and after more crying all the relations of the deceased get their hair cut off, collect it carefully, and carry it to a place where two roads meet. Three months later the ceremony of the *Bona* takes place. A large quantity of *Pombe* having been prepared, the relations and their friends repair to the house in which stands the grave. Outside the house a hole is dug, and a pot of *Bombe* placed in it; this pot is

[1] These are the generic names of the tribes of the Zambezi near Tete: they extend to the N. as far as the Mussanangwe River.

then covered with a wooden dish in which a small quantity of flour is dropped.

The door of the house is then opened and a sheep brought in. After removing the pot that had been left above the head a small hole is dug in the same spot, and *Pombe* poured in it. The sheep is then slaughtered, its blood being allowed to run into this same hole: the carcass of the animal is taken outside, and the door once more closed up. The meat is cooked and eaten by the mourners, who wash their hands in the *Pombe* that has previously been placed in a hole before entering the house.

The funeral procession then retires as follows: One of the wives of the deceased is carried on the shoulders of a man, and followed by all the people who clap their hands, whilst some of them beat drums. This woman is called Musimo (the spirit), her head is covered up with a piece of calico, and on the way she constantly calls out for *Pombe*, and when this is brought to her she drinks it under the calico covering her head. The procession goes in this way to the house of the head widow, outside which a large hole has been previously dug and well cemented. *Pombe* is poured in this hole, and everyone lies down and drinks the *Pombe* without help of spoon or vessel. A great feast then follows, consisting of meat and *Pombe*, and everyone dances at the sound of "batugues." It is only then that the heir is placed in possession of his inheritance, and when mourning has been worn it is then discarded. The property goes to the son of the chief wife if he has reached the age of manhood, or to the chief wife herself if her son is a minor. The chief wife is *usually* the first wife, but not always, a man having the right to make anyone of his wives his chief or head wife.

Only men of a certain standing are buried in their own house. Common people or slaves are either thrown into the Zambezi and soon devoured by the crocodiles, or else placed in some hole amongst the rocks.

The Arungo and Marombo Ceremonies amongst the Tshinyungwe.

By Lionel Decle.

When a person of certain position falls ill a doctor[1] is called to perform the ceremony of Arungo. The doctor is always a woman. On her arrival the sick person sits on the ground with a small basket on his side. The doctress[2] passes her hands along his body and his legs, and pretends to place what she has drawn out of him in this way in the basket, this basket has a special name (Msitsha); his relations then do the same; it is the "Musimo"

[1] Before the doctor performs any ceremony her fee has to be paid in advance. This fee consists of eight fathoms of calico, one goat, and five panchas (about 300 lbs.) of Mapira, kind of millet.

[2] Niabezi.

(spirit) that is supposed to be drawn out of his body and placed in the basket. A piece of calico is then placed over the basket, and well tied up with bark string, in order to prevent the Musimo from escaping. The basket is left in a corner of the hut until the next day when the doctress returns. She goes to the basket, and taking it up, addresses the Musimo that is in it, usually in the following terms:

"You are well, are you not? You have slept well?"

The Musimo replies from his basket by a low whistle.[1]

The doctress translates this to the family: "The Musimo says that he has already died once, and that he feels well."

"Are you well in this basket?" adds the doctress, "and will you remain in it?"

Another low whistle from—the basket.

"Yes, yes," says the spirit, "I am quite well, and I wish to remain where I am."

Three days later the Marombo is performed. The sick man goes with his family to the doctress's house, where *Pombe*[2] has been prepared. He is placed on a mat, the head covered with a piece of calico with a gourd on the top of it. The doctress begins to dance in an excited way; the patient moves his head about gently at first, then more quickly, as the doctress gets more excited in her dance. As soon as the gourd placed on the patient's head falls down he rises himself, and begins also to dance, a sign that the sickness is about to get out of his body. All of a sudden the doctress stops short, and placing her hands to her heart, falls down in a faint (?). The "Musimo" is well out of the patient.

Shortly afterwards the doctress cuts the throat of the goat that has been handed over to her as part of her fee; she collects the blood in a spoon, and mixing it with *Pombe* makes the patient drink this. He is now well rid of the "Musimo." Of course, he may still be suffering from the effects of the Musimo's passage in his body, in which case against further payment—in advance—the doctress will give him medicines, and—curiously enough, sometimes cure him. The chief remedies used by these native doctors are purgatives, astringents, and emetics made out of plants and roots. They also use certain woods, the external application of which causes first-rate blisters.

The Ma-Goa.

By Lionel Decle.

[WITH PLATE XX.]

During my journey from Zumbo to Tete I stopped for nearly a fortnight near Tshikoa some ten miles W. of the entrance of the Quebra-baço[3] gorge.

[1] A most clever effect of ventriloquism performed by the doctress.

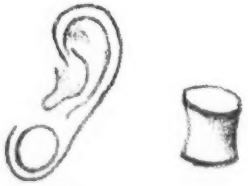
[2] Native beer made of fermented *mapira*.

[3] Quebra-baço, the old Portuguese name for these falls means "break the spleen" from the violence with which the paddlers must paddle against the lower rapids.

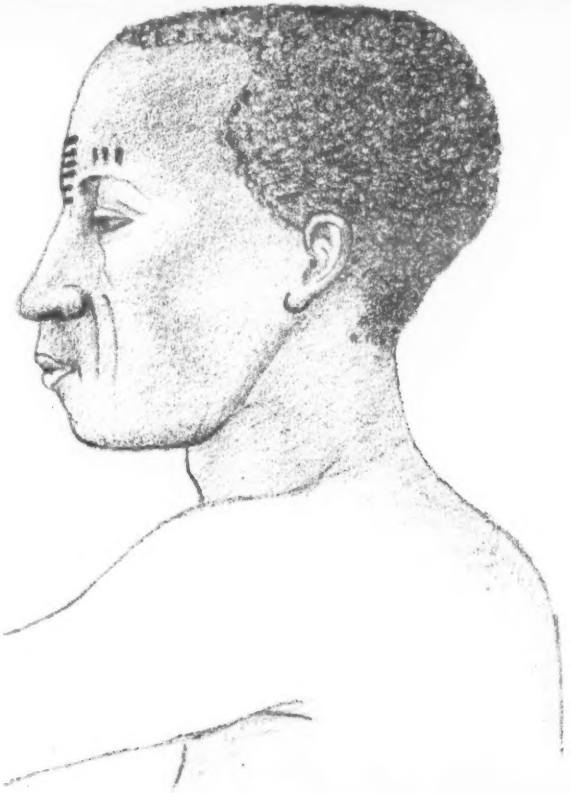
Ma-Goa Woman.

Iniamecuta near Tschikoa.
Upper Zambezi.

Tattooing Knife



Mapéreré.



Ma-Goa Man.

I was very much struck with the appearance of some of the natives I met there, as they differed so thoroughly from all the people amongst whom I found them; much lighter in colour, their features are altogether different from those of all the natives I came across so far. What struck me mostly in them was the straightness of the lip and of the nose; in fact amongst most of them the lip falls almost at a right angle from the nose; their lips are also small and well shaped. On the other hand their cheek bones are prominent like those of the majority of natives of Africa. Their eyes however are larger, more opened, and do not present the veiled appearance usually characteristic of the Bantu tribes.

They cover themselves with a large number of incisions on the face, neck, and body: the women wear a brass ring in the upper lip: the incisions made on the face and body are very deep and leave a heavy raised cicatrice of a blueish colour obtained by the application of certain ashes upon the wounds. The position and designs of these marks are very similar to those we find amongst the *Tawala* living between the Daki and Musanangwe rivers. The Ma-Goa I have just described seem to live on the banks of the Zambezi, chiefly on the left bank of the river in the vicinity of the Quebra-baço gorge: they are in small numbers and are very little known. From what I could gather, they are, if not the original, at least the oldest inhabitants of this region. The women wear huge buttons of ivory[1] in their ears, as shown in the accompanying sketch. They manage, after gradual training, to insert in their ears pieces of ivory of nearly 1 inch in diameter. Besides distending the ear the great weight of these Mapéréré causes the ear to become of a tremendous length.

I enclose a copy of a sketch I took from nature of a man and a woman of this tribe: the likeness is, I have been told, quite correct, but of course the drawing—as a drawing is miserable.

I had unfortunately no time to study these people as I should have liked to do, and I have alluded to them hoping that by calling attention to them some other traveller will observe them more closely and tell us whether they are really worthy of special investigation.

The Watusi.

By Lionel Decle.

Of all the various African races, the Watusi are amongst the least known, although they certainly deserve a special study. They have, so far, been described under the name of Wahha, but the latter are really but the greatest tribe of the Watusi race. These

[1] These buttons are called Mapéréré; it strikes me that this is the same word as the Pélélé of the Mañanja, a similar ornament, but worn in the upper lip; the Ba-Senga women also wear this ornament (?) in the upper and lower lip, but call it *Tshindanda*. The Ba-Senga live in the immediate neighbourhood of the Ma-goa.

Watusi are to be found close to Lake Tanganika on its eastern side, but do not come so far as the Lake itself, being separated from it by the Wajiji and the Warundi. The limits of their habitat can be roughly defined as follows: to the W.[1] 30° 30′ long. E., to the S.[2] 4° 50′ lat. S., to the E.[3] 31° 40′ long E. They extend to the N. so far as the Waruanda[4] country and they are from what I have been able to gather closely connected with the latter.

Few travellers have so far come into close contact with the Watusi or Wahha, as they are more commonly called by travellers. Stanley crossed a very slight portion of their country; more recently Dr. Baumann crossed a large portion of the northern part of Uhha (the land of the Wahha), but I have not yet been able to see his observations on these people. I am the first traveller who has crossed the whole southern part of the Uhha country, this, on my way from Ujiji to Urambo, and I was very much struck by the extraordinary difference that is to be found between them and their Bantu neighbours. Pure types are not common and are only to be found amongst the aristocracy—if I may use such an expression for Africans. The mass of the people have lost their original type through intermixture with neighbouring tribes.

The pure types have long thin faces with a long fine nose and a small mouth, their colour is of a rich brown without the violet black tints usually found in the Bantu races. But what is most striking in them is their hair; it does not grow in woolly patches of a dull colour, but is of a glossy black evenly spread all over the head and with but a slight curl in it. In fact it looks very much like the hair of the Abyssinians. The Watusi range in height from 5 ft. 6 to 5 ft. 8: their hands and feet are small. In fact they appear to me like a kind of connecting link between the Abyssinian and Bantu types. They are very industrious; their huts are most comfortable, built in a bee hive shape; except where big chiefs live, no proper villages are to be found, but clusters of three or four huts disseminated all over the country. They use artificial bee hives made of a piece of bark about 3 ft. long and covered with grass; the extremities are closed by coils of grass, a small hole being left at one of the ends. They place these in the trees and gather in this way large quantities of honey. They have large numbers of splendid cattle with huge horns; some of the bul's reach over 16 hands. Chesnut seems to be their favourite colour.

Each cow gives daily about three quarters of a gallon of milk, out of which they make butter: they have a curious custom connected with the making of it. All the wooden jugs used to gather the milk and the calabashes in which they make butter are cleaned (?) with urine. They pretend—and this I need hardly say is quite wrong—that otherwise no butter can be got from the milk.

[1] There the Wajiji begin.
[2] The Wavinza are their neighbours there.
[3] There the Wanyanwezi begin.
[4] The Waruanda call themselves white men, and deny all connection with the Bantu tribes.

In the evening when the cattle are brought into their kraals, the shepherds light large fires round which the animals gather; their tameness is most remarkable.

In the Musérere valley, amongst the Unyonga mountains, for the first time in the whole of my journey through Africa I found artificial irrigation.

The costume of the women consists of bark cloth fastened above the breasts and falling below the knees. They wear heavy bracelets of brass that they manufacture themselves; the copper however is not found in the country, and these bracelets are made from brass rods bought from the Arabs and melted down: little or no beads are used as ornaments, and their ears are neither pierced nor deformed. Men and women wear round their ankles innumerable coils of iron wire representing sometimes a weight of many pounds.

The men cover themselves either with a skin or a piece of bark cloth tied with a string over the right shoulder and falling down to the knees. Their ornaments are numerous: almost every man wears round his neck some charm filled up with "dawa" (medicine); the most common of these charms consists of two pieces of ivory hollowed out (see sketch).

An ornament to which they attach great value and that is only possessed by a few is made out of a circular hippopotamus tusk sliced in the middle and reduced to the thickness of a strong paper-knife; they tie these with a string on the right side of their necks, the pointed end sticking out at the back of their neck. Heavy ivory bracelets about 3 inches long and nearly 1 inch thick are also much appreciated; those who cannot afford ivory make them of wood.

But where the Watusi excel is in the art of basket-making; they make beautiful soft baskets for sifting flour, grass cups that hold water as well as any glass; their prettiest work of this kind is to be found in the covers they make for their milk jugs. All this basket-work is ornamented with interwoven designs in black straw.

The bow and arrows are their chief weapon; the bows are very large, from 5 to 6 feet high, and ending at both ends in a sharp point; the strings are made of sinew and of perfect workmanship. The arrow heads are of two different shapes, the more commonly used is the broad arrow, the second one is lance shaped with barbs on the stem. They are fixed on to the wood either with bladder or with stripes of banana wood; the opposite end is notched and has feathers. For killing birds they use arrows with heavy wooden heads. They themselves manufacture the iron heads, but the iron comes mostly from the Wanyamwezi country. I have never seen poisoned arrows amongst them, and I believe that they are not used; when I came through the village of 'Mtali, one of the principal chiefs of the country, the people were daily expecting to be attacked by Untagazo, another big chief; all the people were armed to the teeth, but I never saw one single poisoned arrow; unfortunately the war only broke out after my departure so that I cannot speak of their tactics. Besides bows and

arrows each man carries two assageïs. On the part of the Malaglarazi river that runs through their country they have boats, a few hollowed out of borassus palms but most of them made of bark sewn together and held out by cross pieces of wood. These boats, or rather bark canoes, when empty, are all distorted, and so fragile-looking that one would hardly think that they are able to support the weight of a man, but I have seen them filled up with seven natives and several loads, standing perfectly steady.

Of the Kitusi language I can say nothing; one thing is however certain: they understand Kinyamwezi.

These notes on this most interesting race are of course very short, but I could not study the people as I should have liked to do. During the whole time I travelled through their country they tried to break into my camp almost every night, and they even succeeded in carrying away a large number of my things besides two guns. It was with the greatest difficulty that I avoided an open fight with them, and of course under the circumstances a thorough study of the people was out of the question. As to measurements I could not find one single man who would allow me to measure him. I only managed with the greatest difficulty, and through the attraction of a large present, in measuring two women.

MEASUREMENTS OF TWO WATUSI WOMEN.

	Age Between 25 and 30.	
	No. 1 (see sketch.)	No. 2.
	ins.	ins.
Standing height	66	65
Height to chin	56½	56
Max. length of head	8¼	9
„ breadth „ „	4⅛	—
From root of nose to Inion	15	14
Greatest circ. of head	22	21½
Tragus to Tragus over top of head	13¼	12½
Length of nose	2	2¼
Breadth „ „	1¼	1⅞
Circumf. of neck	10¾	10⅝
„ „ wrist	6	5¼
„ „ chest	30½	31½
„ „ waist	26	27
Span of arms	69	65
Length of hand	8	7
„ of foot	10	9
Cubit	18½	17½
Length from ground to point of middle finger	24	24
Colour of skin	Between 29 and 30 (Broca's table).	
„ „ eyes	Brown.	
„ „ hair	Glossy black (41 of Broca's table).	

Annual Report of the Bureau of Ethnology (Smithsonian).

By A. W. Buckland.

The ninth annual "Report of the Bureau of Ethnology" (Smithsonian) brings that carefully prepared and elaborately illustrated work up to the year 1888. Three volumes have been issued in quick succession, so that perhaps the publication may soon be brought up to date. Each of the later volumes has also been accompanied by a bibliography of various Indian tribes, of great use to students, but not of so much general interest as the papers in the body of the work.

Of these we may note in vol. vii an important paper by the Director on "Indian Linguistic Families," accompanied by a map showing the distribution of the various linguistic stocks, of which the Athapascan and the Algonquian now occupy the largest amount of territory, although the Esquimauan seems to have extended all round the northern coasts to the Gulf of St. Lawrence, whilst on the Pacific coast there is a singular intermingling of all the continental tongues with many which apparently do not extend into the interior, suggesting either a constant struggle for possession of the seaboard, or frequent immigrations from the Pacific.

Both the people and the languages of the vast American continents are unsolved riddles. Ethnologists regard all the numerous tribes as belonging to the same Mongoloid race, yet the languages spoken appear to be more numerous and diverse than in other parts of the world occupied by various races. North of Mexico to the arctic regions, Major Powell reckons fifty-eight linguistic families, each containing several tribes, and of these he says, "It is believed that the families of languages represented upon the map cannot have sprung from a common source; they are as distinct from one another in their vocabularies, and apparently in their origin, as from the Aryan or the Scythian families," and again he says, "There is little reason to doubt that, as the result of investigation in the field, there will be discovered tribes speaking languages not classifiable under any of the present families."

"All the families occupy the same basis of dissimilarity from one another, *i.e.*, none of them are related, and consequently no two of them are either more or less alike than any other two, except in so far as mere coincidences and borrowed material may be said to constitute likeness and relationship," and he adds, "There is not a single Indian linguistic family which does not contain words similar in sound, and more rarely, similar in both sound and meaning, to words in English, Chinese, Hebrew, and other languages."

Notwithstanding the manner in which these linguistic stocks have become widely separated in some parts and intermingled in others, reminding one of the changes in a kaleidoscope, Major Powell, contrary to the common opinion, regards the Indians as

sedentary rather than nomadic, and traces many of the dialects to internecine strife. "Factions," he says, "divided and separated from the parent body, by contact, inter-marriage, and incorporation with foreign tribes, developed distinct dialects or languages." But if languages have thus arisen, it does not seem possible that they could have become so totally dissimilar as these appear to be.

The subject is an extremely difficult one, and is confessedly in its infancy, but the Director of the Bureau of Ethnology and his able assistants are doing much to bring order out of chaos.

In continuation of his linguistic studies, Major Powell is preparing a map to show the original habitat of the several tribes, a comparison of which with the one now issued will be of great interest.

As bearing upon Major Powell's belief in the generally sedentary character of the Indian tribes, Mr. Victor Mindeliff's exhaustive "Study of Pueblo Architecture," in vol. viii, deserves especial notice. The Pueblos extend over an immense tract of country, chiefly in New Mexico and Arizona, and include those remarkable cliff dwellings in the Canyon de Chelly and the Chaco Canyon, the description of which is not included, being left for a future article.

The architecture of all the Pueblos appears to be of the same type, consisting of square stone-built houses or lodges, built in terraces one over the other, or partly scooped out in sandstone cliffs, access to most of them being by ladders. Some of these Pueblos are still inhabited, but many are ruined and deserted, the age of these remaining undetermined, although some have certainly been occupied since the Spanish Conquest.

From the general likeness of all these dwellings, Mr. Mindeliff believes that both the ancient and modern Pueblos have been constructed by the same tribes at various periods, even the most ancient by the ancestors of the present Zunis, Navajos, Apaches, and kindred tribes. The traditions of the present inhabitants treat of many migrations, owing to wars, famines, and other disturbing elements, and contain many curious myths of the origin of the various cognate tribes.

Every Pueblo contains several *kivas*, that is, buildings devoted to the religious ceremonies of the people. These kivas are all built on one plan, and are apparently, as a rule, oriented to the south-east. The corner-stones are laid at the cardinal points by a medicine man, with special prayers, and when finished the kiva is consecrated by a sprinkling of sacred meal and the hanging up of prayer sticks.

The ancient kivas are supposed to have been circular in form, but the modern are all rectangular and partially subterranean. One peculiar feature is that each is furnished with a hollow about a foot deep, covered with a slab of wood, in which is bored a hole fitted with a wooden plug. This is the holy of holies, round which the fetishes are placed; it represents the hole through which the human race emerged after their creation in the lower world; for

the traditions of all these Pueblo Indians say that men were created in a dark cavern, whence they reached the upper world by four stages, all of which are represented in the kiva, as also the magic pine tree or reed by which they ascended, which is typified by a ladder always of pine. This myth seems to bear a strong resemblance to the story of Jack and the beanstalk. There is another which probably accounts for the orientation of the kivas, and which appears to be of considerable importance; it relates that a brilliant star arose in the south-east which would shine for awhile and then disappear. The old men of the Snake people said, "'Beneath that star there must be people'; so they determined to travel toward it. They cut a staff and set it in the ground, and watched till the star reached its top, then they started and travelled as long as the star shone; when it disappeared they halted, for the star did not shine every night, for sometimes many years elapsed before it shone again. When this occurred our people built houses during their halt; they built both round and square houses, and all the ruins between here and Navajo Mountain mark the places where our people lived."

It is a curious fact that among these Pueblos are found rows, squares, and circles of upright stones, and stone pillars, the latter of which, whatever may have been their ancient use, serve at present "as a datum point in the observations of the sun, made by a priest of Zuni, for the regulation of the time for planting and harvesting, for determining the new year, and for fixing the dates of certain other ceremonial observances." There are also found in the walls of some of the houses stones bored with large circular holes, said to have served as doorways, but as the usual doorways are square, it seems probable that the holed stones had some ceremonial use, analogous to that ascribed to similar stones in the eastern hemisphere.

It is impossible to touch upon the numerous points of interest connected with the masonry and ornamentation of these Pueblos, but it may be necessary to treat of some of them when the promised paper on the Canon de Chelly appears.

One article in each of the three latest volumes is devoted to Indian myths and ceremonies. That upon the Midé-wiwin or "Grand Medicine Society of the Ojibwa," by W. J. Hoffman, is a full account of that remarkable combination of magical rites and jugglery, with a certain amount of medical skill in the administration of herbal remedies. In this great secret society there are four grades, the admission into each being accompanied by many curious ceremonies in which the sacred medicine bags play a great part, being employed, as is supposed, to shoot into the body of the candidate the migis shell, the sacred emblem of the society. The shaman who has passed into the fourth grade is believed to be possessed of miraculous powers. In all these ceremonies the number four and its multiples are constantly employed, and crosses symbolical of the cardinal points, and painted in accordance with the custom of the tribe, are set up as sacred objects The records of the

society consist of remarkable pictographs or hieroglyphics on birch bark, and appropriate songs accompany every ceremony.

Mr. Mooney's article upon "The Sacred Formulas of the Cherokees," vol. vii, forms as it were a supplement to that on the Midé-wiwin of the Ojibwa. It contains the medical and magical formulas employed by Cherokee shamans in all diseases, consisting of invocations to animal gods, the Sun, Thunder, Fire, Water, the Red Man, the Red Woman, Little Men, and Little People, or Fairies, who are invoked in mystical songs, not only in cases of sickness, but for success in love, war, or hunting, or to destroy an enemy, the means employed recalling those in use for the same purpose by witches in Europe. In these invocations a very archaic language is used, a kind of sacred tongue, hardly understood even by the shamans.

The ceremonial of Hasjelti Dailjis and Mythical Sand Paintings of the Navajo Indians, by James Stevenson, vol. viii, appears to be a variant of the ceremonies described by Dr. Washington Matthews in "The Mountain Chant," and gives four more of the remarkable sand paintings employed by the Navajos in their healing ceremonies. The elongated figures surrounded by the anthropomorphic rainbow are similar to those of the Mountain Chant, but the combinations are different. The use of a square of four sticks tied at the corners, to symbolize the four winds, seems to give a clue to the meaning of this figure as found on engraved shells, and in Mexican paintings. There is also an elaborate description of the preparation of various medicine tubes, and of the foods eaten during the ceremonies. The use of masks in the initiation ceremonies is described, as also the sprinkling of sacred meal or corn pollen, which appears to be identical with the Hoddentin described by Capt. John Bourke in his article on "The Medicine Men of the Apache" in vol. ix, by whom it is compared with a powder used in the East and in Japan, as a curative agent and rejuvenator, which according to Capt. Bourke represents everywhere the principle of fertility. Capt. Bourke's paper is full of interesting analogies between the practices of the Indian shamans, and the symbolism employed by them and similar usages in the Old World. The most suggestive perhaps is the use of sacred cords among so many different races in Asia, Africa, and America, as compared with priestly girdles and rosaries, and the use of coloured threads in medicine. It is impossible to name the many curious resemblances brought forward by Capt. Bourke, some of which are perhaps somewhat far-fetched, but the paper is well worth careful study by anthropologists.

The whole of vol. ix is taken up with this paper, and an extremely lengthy one by John Murdoch, on the "Ethnological Results of the Point Barrow Expedition," describing and fully illustrating the natives, their mode of life, tools, and household arrangements, religious and medical observances, preparation of food, drink, dress and ornaments, their dancing masks, amulets and remarkable carvings in bone and ivory, their music and

songs, and mode of disposing of the dead, showing them to be a simple and ingenious people, but not differing greatly from other Eskimo tribes.

"Ethnographische Beschrijving van de Westen Noordkust van Nederlandsch Nieuw-Guinea." By F. S. A. de Clercq, with the assistance of J. D. E. Schmeltz. pp. 1–15, 1–300, with 42 plates and 51 illustrations in the text. 4to. Leiden. P. W. M. Trap. 1893. In this handsome volume Messrs. de Clercq and Schmeltz have given to anthropologists the most complete account hitherto published of the handicrafts of the natives of the north and north-west portions (from Humboldt Bay to MacClure Gulf) of Netherlands New Guinea and the adjacent islands, including Waigéoe and Misol. The native name, locality, measurements, and other details are given of the 682 objects figured in the plates. These comprise articles of personal adornment, such as combs, head-dresses, earrings, necklaces, breast ornaments, armlets, belts, &c. (pls. i.–xiii.); utensils and weapons, including gourds, mats, baskets, pipes, adzes, ladles, pillows, paddles, canoes, prow-carvings, &c. (pls. xiv–xxxiii); various objects (pl. xxxix); pls. xxxiv–xxxviii are devoted to religious objects, there being two plates of *karwars*, two of charms or talismans, and one of painted skulls and other objects. The last three plates contain coloured figures of twenty men from various districts, illustrating the method of dressing the hair, wearing ornaments, and tattooing. The plates, only seven of which are plain, are executed by P. W. M. Trap, and those who know the valuable Internationales Archiv für Ethnographie will know what technical excellence to look for in the illustrations.

The work is divided into three principal parts. Part i. (pp. 1–188) includes the descriptions of the objects noted above. The second part (pp. 189–252) is a careful essay on the distribution in New Guinea of those objects and customs which are illustrated in the monograph, such as food, stimulants, clothing, ornaments, tattooing, houses and house furniture, fisheries, agriculture, transport (canoes, &c.), trade, implements, pottery, weapons, armour, sacred houses, bull-roarer, musical instruments, dance masks, cult of the dead, and talismans. This is followed by four large tables giving the distribution of 164 items in 24 localities in Netherlands New Guinea, 10 in Kaiser Wilhelms-Land, 15 in the British Protectorate, as well as columns for the Indian Archipelago, Australia, Melanesia, Polynesia, and Micronesia. There is also a section on decorative art (pp. 245–252). The volume concludes with a really wonderful bibliography supplemental to Rye's "Bibliography of New Guinea" (Proc. Roy. Geogr. Soc. 1884); besides giving a list of maps and charts, 275 references are cited for travel, &c., 12 for anthropology, 90 for ethnology and ethnography; language, hygiene, meteorology, zoology, botany, and geology are also represented. The volume is well indexed.

From the foregoing account it will be evident that this is a

really important monograph, as it touches on so many subjects, and has been compiled with great care and erudition. Heer de Clercq collected the specimens (which are now in the Rijks Ethnographische Museum in Leiden), and gave their native names, and all the notes not within square brackets of Part I. The descriptions of the objects, and the comparative portion of the memoir we owe to Herr Schmeltz.

The distribution tables will prove very useful, and especially so for those who are not acquainted with the ethnographical literature of Netherlands and German New Guinea; we may assume these to be as complete as possible. Several additions and a few corrections might very well be made in the items for the British Protectorate.

In conclusion, it is only right to point out this is to a certain extent a Government publication, His Excellency the Minister of the Netherlands Colonies having granted a subsidy in aid. This is only one of the many proofs of the intelligent interest the Netherlands Government takes in its Colonies, and in furthering anthropological knowledge. It seems strange with our immensely vaster colonial jurisdiction, and the variety of its components that our government pays so little attention to that science, which is of the utmost importance so far as the inhabitants of those countries are concerned. As a nation we are more concerned with the emoluments than the responsibilities of empire.

Dr. O. Finsch has just brought to a close his "**Ethnologische Erfahrungen and Belegstücke aus der Südsee.**" The sub-title describes this as a descriptive catalogue of a collection in the Vienna Museum. It rarely happens that an ethnological collection in a museum is so fully described as this has been, but in this case the author describes the specimens he has himself collected. The following brief analysis will indicate the scope of Dr. Finsch's papers which have been published in the "Annalen des k.k. naturhistorischen Hofmuseums," Vienna, A. Hölder. The first part was published in vol. iii. (1888) pp. 83–160, pls. iii–vii. (two being coloured) and seven figures in the text; it deals with the Bismarck Archipelago (New Britain, and New Ireland, with a few notes on the Admiralty Islands, Hermit and Anchorite Islands, and Solomon Islands. The second part deals with New Guinea, and is divided into two sections relating respectively to the British and German territories. Vol. iii (1888) pp. 293–364, with pls. xiv–xxv (two coloured) and thirty-six figures in the text, contains an account of 1. British New Guinea, (*a*) the South-east coast, including the district between Torres Straits and Keppel Bay. Vol. vi (1891) contains (*b*) East Cape and d'Entrecasteaux Islands (pp. 13–33), (*c*) Trobriand (pp. 33–36). 2. Kaiser Wilhelms-Land (pp. 37–130). The third part is devoted to Micronesia and was published in vol. viii, (1893); it is illustrated by pls. i–viii (two being coloured) and sixty-five figures in the text. A general account occupies pp. 1–19, then follow the I. Gilbert Islands (pp. 19–89), II. the Marshall Archipelago (pp. 119–182), III. the

Carolines (pp. 182–193) with special accounts of Kuschai (pp. 193–230), Ponapé (pp. 231–275), Ruk and Mortlock (pp. 295–383). Finally from pp. 384–437 there is an appendix giving corrections and additions to previous statements and several indices. Dr. Finsch has wisely had all his articles consecutively paged, in addition to the pagination of the *Annalen*. The whole work thus consists of 675 pages, twenty-five plates (six of which are coloured) containing figures of 250 objects, and 108 illustrations in the text. This is more than a mere illustrated catalogue, for the author has incorporated original ethnological investigations as well as given authentic accounts of the various objects enumerated. Dr. Finsch's practice is to deal with each geographical area in the following manner. Introductory, including native plants and animals, &c.; physical anthropology; under ethnology he groups dwellings, food, stimulants, trade, music, dances, religion, and all the multifarious arts and crafts of the people. The series of papers forms an invaluable addition to the libraries of museums, and of those interested in the ethnography of the Melanesians and Micronesians.

(A. C. H.)

"Irish Druids and Old Irish Religions." By James Bonwick, F.R.G.S., F.A.I. &c. (Griffith, Farran, & Co., 1894). pp. i–viii, and 1–328, small 8vo. Under this title Mr. Bonwick offers to the world a vast collection of facts and opinions collected in "a lengthened course of general reading" about Irish and other Druids, idol worship, serpent faith, sun-worship, fire-worship, stone-worship, animal-worships, and will-worship, and dealing with (amongst other things) sacred plants, holy bells, crosses, round towers, and the Hill of Tara. Opinions are so much more numerous than facts respecting many of these subjects that it is no fault of the author if they seem occasionally to predominate in his pages, but it must be admitted that, while stating all the opinions that have come before him, including those of the Anglo-Israelites, he does not unduly favour any of them—not even the latter. The general impression derivable from reading the book is that much Irish Christianity was derived from Druidism, and that much Druidism was derived from very early, even unknown prehistoric races. All who are interested in these matters should place the volume on their shelves as a brief but handy book of reference, though its value in this capacity would have been greatly increased by more precise indications of the exact spot in each writer's works where the facts or opinions quoted may be found.

"The Germ-Plasm: A Theory of Heredity." By August Weismann. Translated by W. Newton Parker and Harriet Ronnfeldt. (Walter Scott, 1893.) pp. 477, 8vo. The volume, which is dedicated to the memory of Charles Darwin, deals with the material basis of heredity, the germ-plasm; heredity in its relation to monogonic reproduction, regeneration, multiplication by fission, multiplication by gemmation, alternation of generations

in its relation to the idioplasm, the formation of germ cells; the phenomena of heredity resulting from sexual reproduction, modifications of the germ-plasm caused by amphimixis, ontogeny resulting from the union of the germ-plasm of two parents, the phenomena of reversion in their relation to amphimixis, dimorphism and polymorphism, doubtful phenomena of heredity; the transformation of species; its origin in the idioplasm, the supposed transmission of acquired characters, variation. "According to our view, the power of transmission which is possessed by all organisms, and on which the development of the higher organic forms is based, therefore depends on simple growth merely in the case of the very lowest conceivable organisms with which we are not acquainted; while in all forms which have already undergone differentiation, it results from the possession of a special apparatus for transmission."

"English-Sulu-Malay Vocabulary," with useful sentences, tables, &c. By Andson Cowie, edited by W. C. Cowie (North British Borneo Co., 1893). pp. 288.

"The Geographical distribution of disease in Great Britain." By Alfred Haviland. (Swan Sonnenschein, 1892.) pp. 406. "The object of this investigation has been to point out to the medical profession not only where certain diseases *do* thrive, but where they *do not*; with the further object of leading others to inquire why this is the case in their own localities. When this inquiry first took place, in 1868 it was not anticipated that so vast a progress in tracing the causes of specific forms of diseases was at hand. Nevertheless, we find ourselves in full activity in a direction that gives reasonable hopes of discovering, why forcible winds should slay the consumptive; why the earth should afford a soil favourable to the culture of some organic form that is at the source of rheumatism and its frequent sequel cardiac disease; and the time may not be far distant when some of the many forms of micro-organisms that swarm in the sodden clay lands after floods shall be thoroughly examined and their forms and histories known, such investigations being followed by the discovery of those species that are the exciters through their poisons of malignant growths known as cancers; it may also come to pass that we shall find out on what the effect of calcareous soils on these species depend. Search will be made in the deltas and banks of tropical rivers for those organisms which render their malaria so fatal to the human race. And finally, it may be accorded to us to discover the means of protecting our bodies against pathogenic organisms which, from the vast abundance and wide distribution, we are unable to destroy before they attack us." The volume is well illustrated with coloured diagrams and contains various indices.

"The Cliff Dwellers of the Mesa Verde." South-western Colorado, their pottery and implements. By G. Nordenskiöld (P

A. Norstedt, Stockholm) 4to., pp., 174. This magnificent work, containing 94 illustrations in the text, and 62 full page plates, gives a full account of our present knowledge of the subject. "I have described the antiquities of the Mesa Verde, which afford us a glimpse of the daily life of the cliff-dwellers. I have further described similar remains probably to be ascribed to kindred nations, and I have finally given a brief sketch of the modern Indians, whose habits remind us most strongly of the cliff-dwellers, adding to this sketch some details of the life led by the same Indians in the middle of the sixteenth century, as depicted by the Spanish invaders in their narratives. The primitive Pueblo culture as we find it in its typical development among the cliff-dwellers of the Mesa Verde may be traced almost everywhere within a sharply-defined region, the extent of which we have considered. It is evident the cliff-dwellers do not compose a race distinct from these Indians, but are related to them. While we must undoubtedly regard the Pueblo tribes as the descendants of nomadic Indians, the culture of the said tribes shows some very essential distinctions. In certain respects they unquestionably stood higher than their ancestors, the nomadic tribes; but the raising of corn, the tilling of the soil, no longer permitted a wandering life. The nomadic people became an agricultural nation with stationary dwellings. The cave dwellings perhaps represent in part this first grade of the Pueblo tribes' development. The further evolution of the cave dwellings may be traced without difficulty in their transition to cliff dwellings, the caves being divided by walls into several rooms, and . . . a pueblo on the mesa is thus, in fact, nothing but a cave dwelling built in the open instead of in a cave. We are not in possession of any facts that might entitle us to draw any conclusions regarding the date of the Pueblo tribes ascendency. It was probably several centuries earlier than the first visit of the Spaniards to their country. I shall conclude with a brief summary of the results at which I have arrived respecting the origin and development of the Pueblo tribes. They were nomadic Indians whose culture had been considerably modified, and in certain respects elevated by altered conditions of life. The evolution of this culture had nothing in common with that of the ancient Mexican civilization, but during its decadence it was perhaps influenced in some respects by the latter."

"The American Anthropologist." Vol. vi., No. 4. The Navajo, A. M. Stephen. A-wá-to-bi: an archæological verification of a Tusayan legend, J. W. Fewkes. Piñon gathering among the Panamint Indians, B. H. Dutcher. Polysynthesis in the languages of the American Indians, J. N. B. Hewit. Kuskarawaokes of Capt. John Smith, W. W. Tooker. Aboriginal remains of the Piedmont and valley region of Virginia, G. Fowke. The World's Fair Congress of Anthropology, W. H. Holmes. Anthropology at the Madison Meeting, W. J. McGee. Anthropological bibliography.

"Transactions of the Asiatic Society of Japan." Vol. xxi. Esoteric Shintō, P. Lowell. On the manners and customs of the Loochooans, B. H. Chamberlain.

"Journal of the Anthropological Society of Bombay." Vol. xxxiii., No. 3. On Hindu ceremonies observed in the Madras Presidency, M. S. Husain. The first year funeral expenses of a Parsee of the last century (1763), B. B. Patell. On some additional folk beliefs about the tiger, S. C. Mitra.

"Journal of the Asiatic Society of Bengal." Vol. lxii., Part 3, No. 1. The Hindus of Eastern Bengal, (late) Dr. Wise. The marriage customs of Thibet, Babu Sarat Chandra Das. Measurements of Cingalese Moormen and Tamils, 1892, H. H. Risley. No. 2. Modern customs among the Bedouins of the Haurán, Col. H. S. Jarrett. No. 3. Notes on Anthropology, H. H. Risley. On some superstitions regarding drowning and drowned persons, Chandra Mitra. On some beliefs in a being or animal which is supposed to guard hidden treasure, Chandra Mitra. Anthropometric instructions.

"The American Antiquarian." Vol. xvi., No. I. Origin of the Indians, Cyrus Thomas. Was the serpent symbol aboriginal? S. D. Peet. Characteristics of American languages, D. G. Brinton. The Suastika and allied symbols, C. S. Wake. Prehistoric pottery from the middle Mississippi valley, J. D. Butler. Japanese art on Puget Sound, J. Wickersham.

"Bulletins de la Société d' Anthropologie de Paris." Vol. iv., No. 5. Origin of circumcision among the Jews, Letourneau. Prehistoric station at Prévilliers (Oise), Raymond. Megalithic inscriptions, de Closmadeuc and Bonnemere. Quaternary beach near Lion-sur-mer, Viré. The Ainos, Michaut. No. 6. Neolithic station at les Hogues, near Yport, Capitan, and Jamin. Palæolithic bed at San Isidro, near Madrid, de Baye. Experiments on various arrow poisons, Rondeau. No 7. Neolithic station at St. Aubyn, near Elbeuf, Capitan. Neolithic funeral grotto at Livry-sur-Vesle, Schmit. No. 8. The dolmen at La Fontaine (Loire et Cher), A. Couette. The normal origin of crime, Manouvrier. The Danakils (between Massaouah and Lake Assal), Dr. Santelli. No. 10. Replies to anthropological questions from the Island of Halmaheira, Dutch Indies, Van Baarda.

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